INDIA RUBBER WORLD

OUR
62nd YEAR

A BILL BROTHERS PUBLICATION

OCTOBER, 1950

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DETROIT

Our job is to give you quality carbon blacks...

in the quantities you need, exactly when you want them. Cabot's been doing that job since 1882, leading the industry in quality and service, continually expanding production in step with the demands of the rubber industry.

Godfrey L. Cabot, Inc.
77 FRANKLIN STREET BOSTON 10, MASS.

✻ Right now all existing facilities are being operated at their maximum potential. Soon there will be new Cabot units ready for action . . .

IR v.123 Oct 1950 - May 1951

Look to Du Pont for a COMPLETE line of

THIURAM ACCELERATORS

THIONEX (Tetramethylthiuram monosulfide)

Versatile Thionex is an effective, economical primary or secondary accelerator for rubber, GR-S and Buna N. The delayed curing action of Thionex results in excellent processing safety and makes it ideal for stocks requiring good mold flow. In wire insulation compounds Thionex provides fast cures and excellent electrical properties. GR-S stocks accelerated with Thionex are not only safe-processing and fast-curing—they have a long curing range.

As an activator for thiazoles, Thionex is safer-processing and more economical than guanidines or dithiocarbamates.

Available in dustless grain form for ease and convenience in handling.

THIURAM M (Tetramethylthiuram disulfide)

Thiuram M may be used either as a primary or secondary accelerator. And, since 13% by weight of Thiuram M is sulfur available for curing, Thiuram M can be substituted for sulfur as a vulcanizing agent. Non-sulfur or low-sulfur compounds accelerated with Thiuram M have excellent resistance to aging and heat deterioration and display extremely low compression set values. As an activator for thiazole accelerators, Thiuram M is excellent.

It is available in dustless grain form for ease and convenience in handling.

Thiuram E (tetraethylthiuram disulfide) is also available from Du Pont.

TETRONE A (Dipentamethylenethiuram tetrasulfide)

Tetrone A is an excellent accelerator and vulcanizing agent for low-temperature curing of rubber compounds. It contains 25% by weight available sulfur—is active at temperatures as low as 230°F. Compounds vulcanized with Tetrone A have low set and outstanding heat resistance.

In latex, Tetrone A is also a valuable activator for thiazoles, such as Zenite. Compounds accelerated with such combinations are fast-curing and have excellent aging properties.

And, of real importance, Zenite-Tetrone A combinations have minimum tendency to precure and do not adversely affect stability.

Tune in to Du Pont "CAVALCADE OF AMERICA" *Tuesday Nights—NBC coast to coast*

For samples, see your Du Pont representative or write E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

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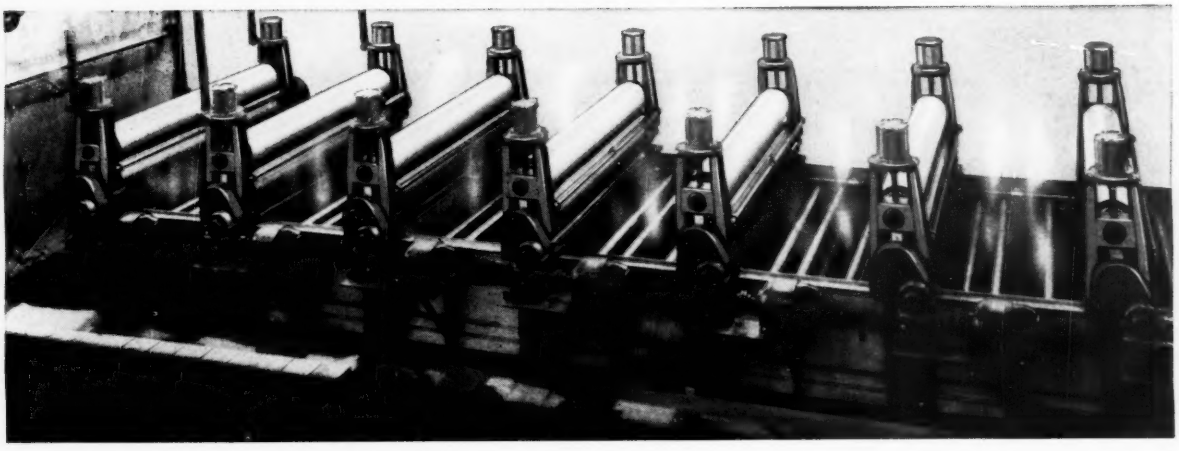
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

INDIA RUBBER WORLD, October, 1950, Vol. 123, No. 1. Published Monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Orange, Conn., under the act of March 3, 1879. Subscription United States and Mexico, $3.00 per year; Canada $4.00; All other countries $5.00; Single Copies 35 cents. Address Mail to New York Office.

Another development using

B. F. Goodrich Chemical Company ***raw materials***



Crabbing Machine made by Birch Bros., Inc., Somerville, Mass.

Hycar rolls covered by Tyer Rubber Company, Andover, Mass.

The heats on Hycar in this crabbing act!

IN this Birch Continuous Crabbing Machine, the fabric is passed through boiling water to prevent the formation of creases, puckers and irregular shrinkage. The fourteen Hycar rubber covered rolls squeeze liquid from the fabric as it passes from one vat to another. They operate continuously under comparatively high pressures, must withstand boiling water and steam—as well as detergents, wetting agents and cleaning fluids.

Ordinary roll coverings tend to deteriorate under such punishment, soften and wear excessively. But not roll coverings properly compounded of *Hycar*. For Hycar has unusual advantages — exceptional resistance to high temperature, abrasion, aging, most chemicals and oils. Hycar-covered rolls have operated for many months without the slightest tendency toward softening or deterioration.

What Hycar does here in helping maintain good product performance, and reducing operating costs, may point a way it can help you improve or develop products. Hycar resists oils and solvents, heat, weather and wear—has many more advantages. We'll gladly help you. For technical assistance, please write Dept. HC-5, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio.

Need high tensile strength? Hycar has it—plus abrasion resistance and more advantages.

Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Philblack* O *and* Philblack* A

Remove the nerve the easy way!

You always get smooth, accurate extrusions with Philblack A or Philblack O. Rubber stocks mix promptly . . . without balky nerve difficulties. Furthermore, uncured stocks compounded with the Philblacks possess desirable plasticity, workability and excellent mold flow. When compounding, include either or both of these fast-curing, easy-processing Philblacks.

Philblack A and Philblack O are available in bags or bulk. Send your order today. Then relax and let the Philblacks solve your processing problems!

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Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

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A NEW ACTIVATOR

Naugatuck recommends VULKLOR with G-M-F for Butyl Compounding

- ***Faster Curing***
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- ***Superior Aging***
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*WRITE FOR COMPOUNDING RESEARCH REPORT NUMBER 14.

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Reclaimed Natural and Synthetic Rubber—Aromatics — Agricultural Chemicals, SPERGON, PHYGON and TUFOR — MARVINOL Vinyl Resins — KRALASTIC Molding Powders — LOTOL, Compounded Natural and Synthetic Latices — DISPERSITE, Water Dispersions of Reclaimed Rubber and Resins—SURFA-SEALZ, Rubber Compound for Surfacing Highways — VIBRIN, Polyester resins — Rubber Labels — Heavy Chemicals.

Naugatuck Chemical

Division of United States Rubber Company

NAUGATUCK CONNECTICUT

In Canada: NAUGATUCK CHEMICALS DIVISION
Dominion Rubber Company Limited, Elmira, Ontario

SAVES UP TO 60%

by using Bemis TITE-FIT TUBING

This recent letter from a Tite-Fit Tubing customer shows what big savings are realized when this waste-eliminating method is used.

This versatile tubing fits almost any shape and a wide variety of package sizes. One roll may cover many different diameters and lengths without waste.

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Bemis Brothers Bag Company
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Gentlemen:

We have used Tite-Fit Tubing since its inception over 10 years ago. Accurate time study figures show our savings in labor costs on regular packaging operations to be as high as 33⅓ to 60%.

In addition, Tite-Fit Tubing has also provided the superior covering that is required for our export packaging. We are particularly pleased by the favorable comment we receive from our customers on the neat, secure bales in which our merchandise is shipped.

Very truly yours,

Ward A. Hamm

Traffic Manager,
Thermoid Company

Perhaps you will find equally large savings with Tite-Fit Tubing. It's worth investigating. Get the facts. Mail the coupon now.

BEMIS BRO. BAG CO.
Brooklyn 32, New York

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BEMIS BRO. BAG CO., 5134 Second Ave., Brooklyn 32, N.Y.

☐ Send descriptive folder on TITE-FIT TUBING
☐ Send sample. Our packages are approximately ____ inches in circumference. (Please specify).

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DON'T take our word for it. Test PLIOLITE S-6B against every resin on the market. That's the *real* way to find the resin that's best for your products when you're evaluating a reinforcing resin.

Compare PLIOLITE S-6B with other resins you've tried for shoe soles, flooring, molded and inflated items, electrical insulation and a wide range of other items. Compare on the basis of every characteristic you want in a reinforcing resin—not just one, but all of them in combination.

You'll find—as we did after many comparisons in our own and independent laboratories—that PLIOLITE S-6B, Goodyear's new, easily processed resin, is superior to any other available resin in the majority of the properties you're looking for in a reinforcement.

Write today for full details and sample for evaluation to:

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Pliolite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

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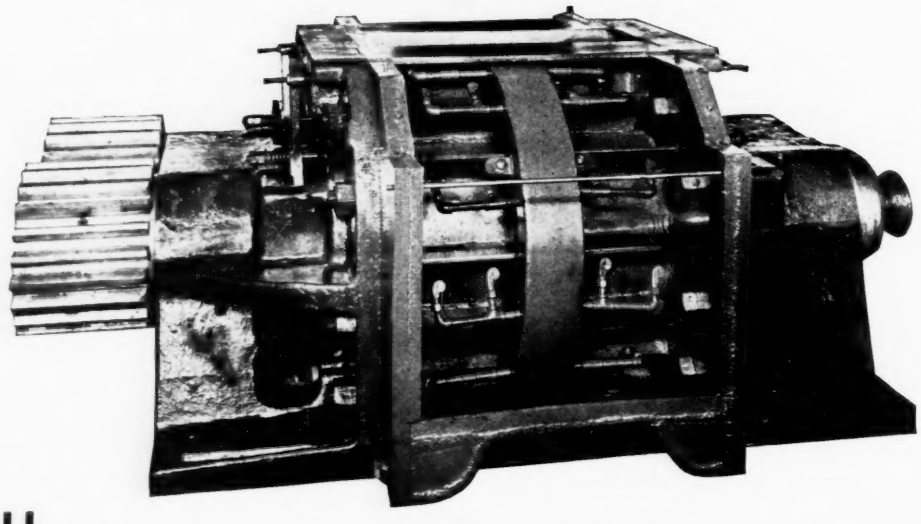


WE WILL

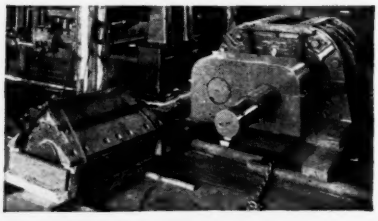
LEND You a BANBURY BODY

Now, you can have your Banbury rebuilt . . . and yet be "down" ONLY A FEW DAYS. We will LEND you a mixer body to use . . . *at no extra cost to you.*

With this NEW, exclusive, plan your mixer output need be interrupted only the time required to pull out your worn body and replace it with the body we lend you. Then away you go again at full speed, while we completely rebuild your own mixer body. When it is ready . . . you just swap again, and return ours.

We have No. 9 and No. 3A spray type bodies, in A1 condition, ready right now for immediate shipment. Other sizes are being added to our lending "stock pile."

Interstate Banbury rebuilding service is now in its sixteenth year. Every job is guaranteed, and so confident are we in our work that we do not hesitate to make this offer.



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YOU'LL NEED MORE

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• H. N. Richards Company, Trenton
The B. E. Dougherty Company, Los Angeles and San Francisco
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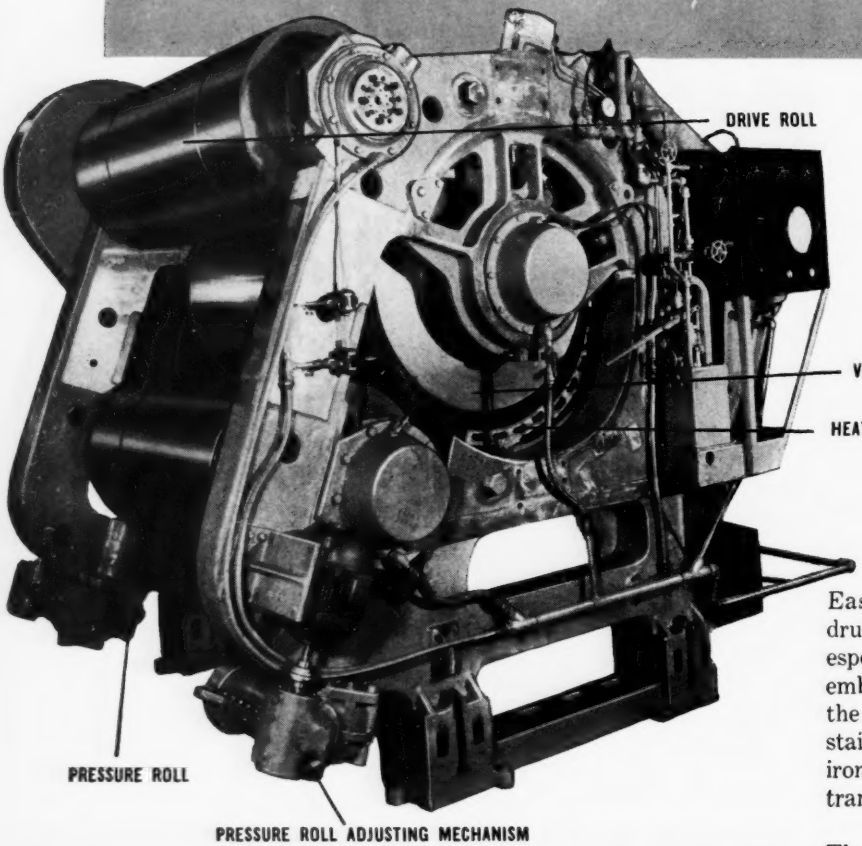
CABOT

A completely new and redesigned

FOR CONTINUOUS

Permits roll and belt

A NEW ROTOCURE, DESIGNED TO GREATLY FACILITATE REMOVAL OF THE VULCANIZING DRUM AND REPLACEMENT OF THE STEEL BAND, IS NOW AVAILABLE AS A RESULT OF COOPERATIVE ENGINEERING BY ADAMSON UNITED COMPANY AND BOSTON WOVEN HOSE AND RUBBER COMPANY



Easy removal of the Vulcanizing drum to make quick roll changes is especially important when use of an embossed curing roll is necessary, as in the production of floor matting and stair treads. The changing of edge irons when producing conveyor or transmission belting is also facilitated.

The pressure (gauging) roll will withstand a separating force of 250,000 pounds per adjusting screw. It is contemplated that certain stocks can be calendered and cured in a single operation, gauging being accomplished between the pressure roll and the curing roll.

ADAMSON UNITED COMPANY

AKRON 4, OHIO

SUBSIDIARY OF UNITED ENGINEERING & FOUNDRY COMPANY

BRANCH OFFICES IN PRINCIPAL CITIES

ROTOCURE*

VULCANIZATION

changes in 1/10th the time!

One piece housings provide adequate "window" clearance for removal of the curing roll. A special "C"-Hook is furnished for supporting the roll as illustrated. All design details have been engineered to facilitate and speed roll changing. For example, all supply and return lines are quick-disconnect type. The heating shoes surrounding the Vulcanizing roll are automatically retractable.

Some desirable features:

- **All rolls are supported in self-aligning roller bearings, oil flood lubricated.**
- **Speed range is adjustable from ½ to 6.2 feet per minute.**
- **Vulcanizing roll is 60" diameter; 80" face.**
- **Tension roll is hydraulically actuated; maximum belt tension, 240,000 pounds.**

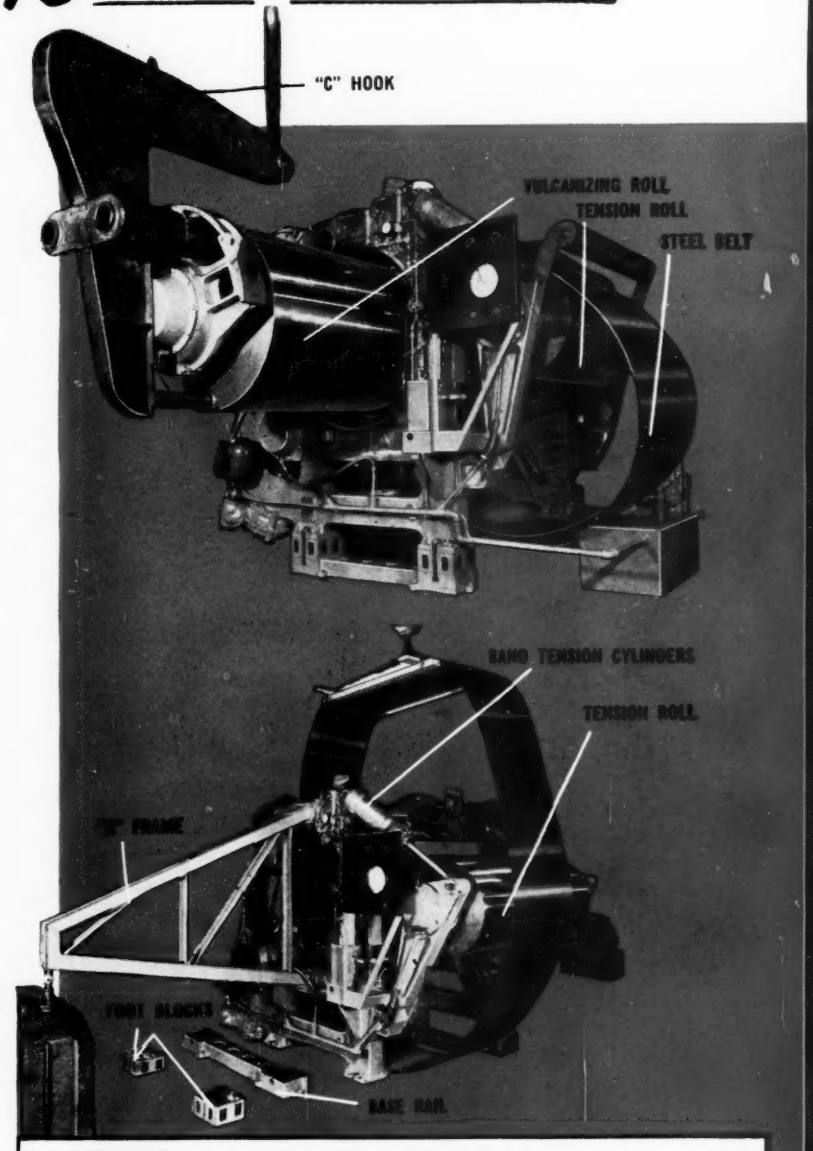
Easy replacement of the steel band is made possible by the ingenious arrangement illustrated. After the curing roll has been removed, the specially provided "A-Frame" is bolted in place and jacked up far enough to remove the weight from the base rail on the near side. The two "foot blocks" are then taken out, permitting the belt to be removed through the resulting opening.

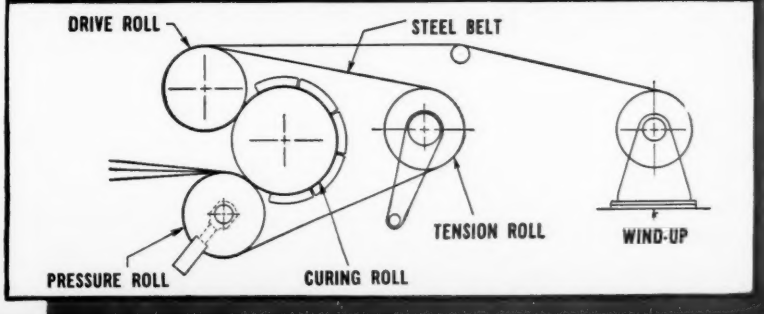
Operation of the Rotocure is shown schematically at right. The Rotocure has many advantages over the conventional press on large production runs. For example:

- **Increased production provided by continuous operation, which eliminates opening, cooling, reheating and closing.**
- **Elimination of overcuring and undercuring of the over-lap areas occurring on conventional presses.**
- **Greater uniformity of stretch.**

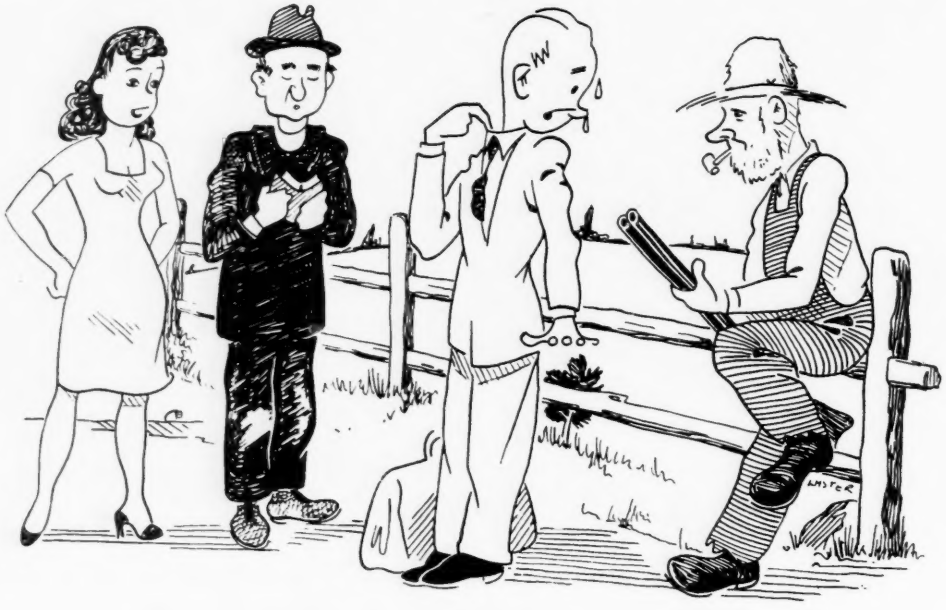
Our engineers are available for consultation concerning the possibilities of the Rotocure for your particular products.

**The Rotocure machine is a patented development of Boston Woven Hose and Rubber Company built by Adamson United Company under a licensing arrangement.*





STUCK FOR LIFE!



When you use TY-PLY, Rubber-to-Metal assemblies are really "Stuck for Life" — the life of the rubber compound itself.

TY-PLY Q for bonding Natural Rubber, GR-S and GR-I compounds to metal during vulcanization.

TY-PLY S for bonding Neoprene compounds to metal during vulcanization.

TY-PLY BN for bonding the nitrile-type rubber compounds to metal during vulcanization.

Stood the test of time since thirty-nine

For Technical Booklet and Samples
Write

MARBON

MARBON CORP.
GARY INDIANA

BUFFALO RECLAIMS are, once again, helping to meet the drastic rubber demands of our national defense

Rubber is an essential defense material, and as such, is subject to first call by our armed forces. As in World War II, Buffalo Reclaims are helping to alleviate the shortage of Crude and Synthetic Rubber. Boats, raincoats, batteries, tires for trucks, jeeps and command cars, parts for submarines, airplanes, guns and tanks, life rafts, pontoons and pressure tape are only a few of the hundreds of items in which Buffalo Reclaims are playing a vital part during this national emergency.

Naturally, the demand of the military is placing an unexpected strain on our production capacity. For this reason, it is now very often impossible for us to ship your complete order or to make promises for future deliveries. This is not an arbitrary stand on our part, but rather the result of a situation beyond our control. Here in Buffalo, all of us are working day and night to squeeze out every pound of reclaimed rubber that it is possible for us to produce. If this will not suffice, if this supply is not great enough to meet the combined demands of all our good friends and customers in both the military and consumer fields, we'd just like to leave this thought with all of you: "Don't blame the Buffalo . . . he's doing his best!"

U.S. RUBBER RECLAIMING COMPANY, INC.

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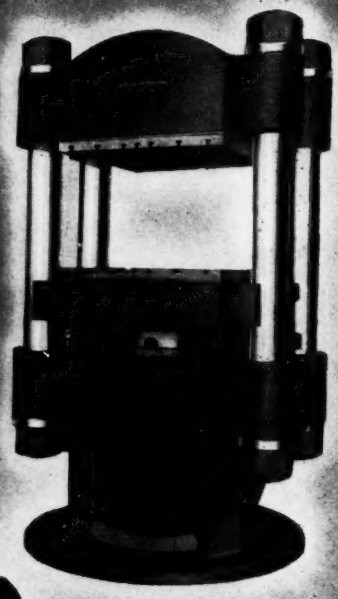

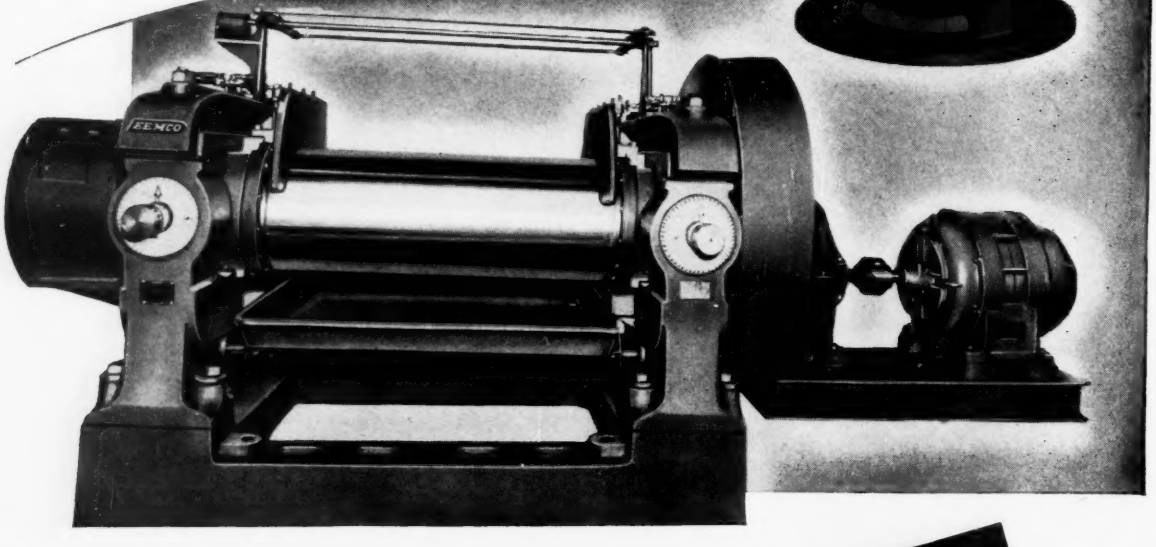

Yes, you will profit, as have many others, if you write to EEMCO for their proposition on Rubber and Plastics Processing Machinery. Engineered right, built right and of best obtainable materials you are assured of longer life and better production when you select EEMCO. If your present or future needs include any of the machines listed below, write EEMCO for a quotation. You will like their attractive prices and quicker deliveries. Standard and custom made, of course.

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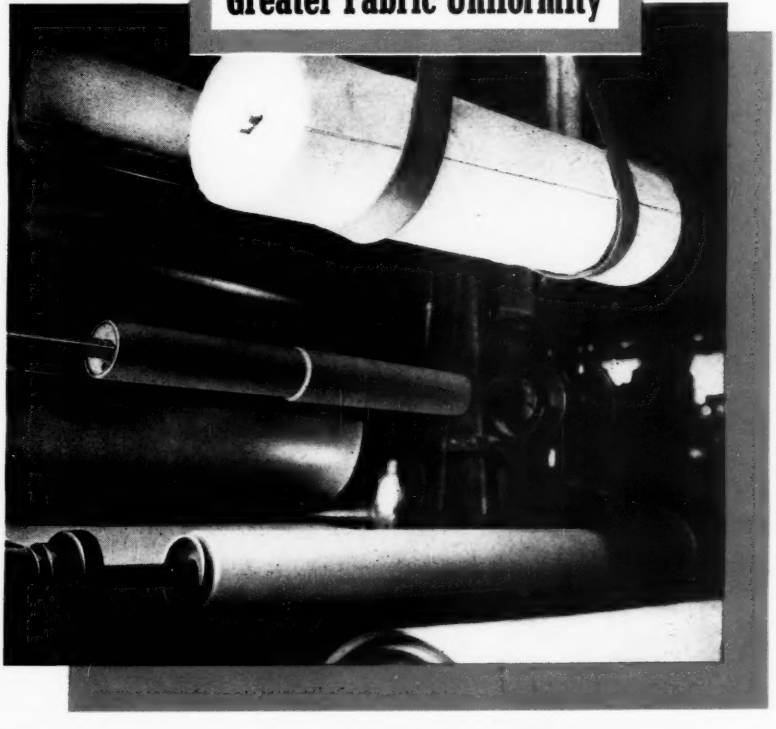
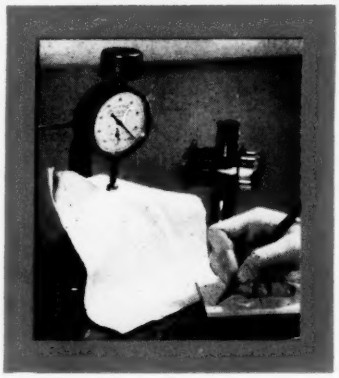
Greater Fabric Uniformity



The greater uniformity of Mt. Vernon fabrics means *consistent* quality in your finished products—smoother, more efficient fabrication.

AT YOUR SERVICE

Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.



GAUGING FABRIC THICKNESS AFTER WEAVING. One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products.

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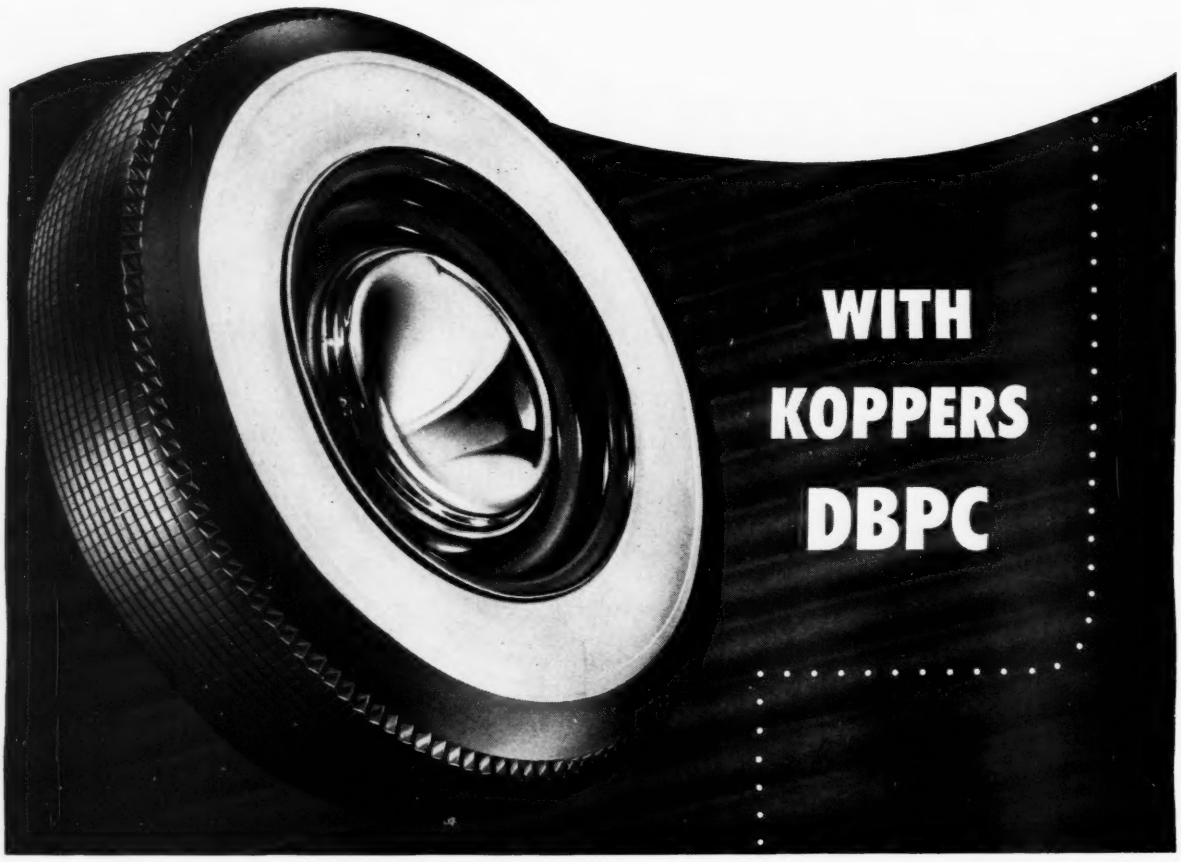
How to obtain *effective age-resistance*

without discoloration or stain



WHITE SIDEWALL TIRES. Added to rubber compounds from which "white sidewalls" are fabricated, Koppers DBPC give age-resistance without causing discoloration.

MOST rubber compounds require the addition of an antioxidant material for age-resisting properties . . . to prevent cracking, checking, hardening and loss of strength. But most antioxidants tend to discolor the finished product or to stain materials with which they come in contact.

For white rubber products . . . white sidewall tires, crepe-soled shoes, sponge rubber cushions, sanitary goods, refrigerator gaskets, and the like . . . Koppers offers you Di-tert-butyl para-cresol (DBPC). Tests have shown that DBPC is an effective antioxidant with non-discoloring and non-staining qualities.

The effectiveness of Koppers DBPC as a rubber antioxidant in comparison with other commercially available antioxidants is discussed in detail in Bulletin C-9-115-2. Write for this bulletin and for other literature on DBPC. Send your requests to Koppers Company, Inc., Chemical Division, Dept. IRW- 10, Pittsburgh 19, Pa.

KOPPERS

KOPPERS COMPANY, INC.

Chemical Division

Pittsburgh 19, Pa.

More Flex Life....
POLYMEL C-128

(A solid friable terpene-styrene copolymer resin)

Highly effective in small quantities

POLYMEL C-128 gives

Splendid physicals—
Maintains hardness—
Excellent flexing—
Good age resistance—
Unusual plasticizing
properties at low cost.

Can be used advantageously in GR-S or natural rubber.

Excellent processing for highly loaded SILENE batches.

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these National-Standard Divisions

specialize in making wire and steel do a better job at lower cost

YOU might be surprised at the roster of leading manufacturers who turn to these National-Standard Divisions for small-size wire and high carbon flat steel for special purposes. The uses are endless—special wire for everything from bottle caps to zither strings . . . steel for countless products from harmonica balancers to surgical instruments and springs for the finest watches.

Perhaps *you* are one of the manufacturers who has found that here research and development dig deeper, go further . . . that here the actual processing of steel and wire is held to a hair line of quality and uniformity.

These things invariably pay off for National-Standard customers in production economies and better product behavior. If you don't *know* National-Standard, or about National-Standard services, we'll be happy to talk over your particular needs or send you a bulletin covering the work and specialties of any of the divisions listed below.

NS
NATIONAL-
STANDARD
Company
NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL	*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
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REYNOLDS WIRE	*Dixon, Illinois*	Industrial Wire Cloth
WAGNER LITHO MACHINERY	*Jersey City, N. J.*	Lithographing and Special Machinery
WORCESTER WIRE WORKS	*Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes

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ORLD

Announcing:

PITTSBURGH PX PLASTICIZERS

a new wide range line

from a single producer

Pittsburgh Coke & Chemical Company is now producing ten quality-controlled Pittsburgh PX Plasticizers—providing the plastics, rubber, and protective coatings industries with a new, reliable source of supply.

The objective of the Plasticizer Division is to make available from one integrated source of supply a line of highest quality plasticizers in sufficient variation of type to fill virtually every need. Pittsburgh Coke & Chemical Company's integrated operations, from the mining of coal to the purification of the finished plasticizer, permit quality control of all manufacturing steps. The Company's position as a raw material producer gives maximum assurance of continuity of supply.

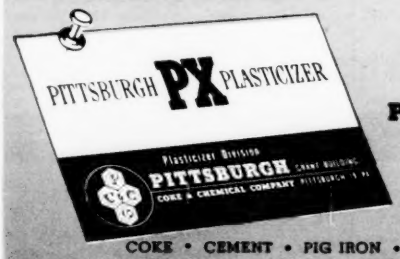
Established evaluation facilities provide our customers with excellent technical service, while continuing research will provide new and improved products for the future.

Descriptive literature on Pittsburgh PX Plasticizers is available upon request. Please address your inquiries to:

Pittsburgh PX Plasticizers

- PX-104 DiButyl Phthalate
- PX-108 DiIsoOctyl Phthalate
- PX-138 DiOctyl Phthalate
- PX-208 DiIsoOctyl Adipate
- PX-209 DiNonyl Adipate
- PX-404 DiButyl Sebacate
- PX-408 DiIsoOctyl Sebacate
- PX-658 TetraHydroFurfuryl Oleate
- PX-916 TriPhenyl Phosphate
- PX-917 TriCresyl Phosphate

Check the above list for your needs — then write today for individual bulletins which give full commercial and technical information about each of the Pittsburgh PX Plasticizers.



Plasticizer Division

PITTSBURGH COKE & CHEMICAL COMPANY

1960 Grant Building • Pittsburgh 19, Pa.

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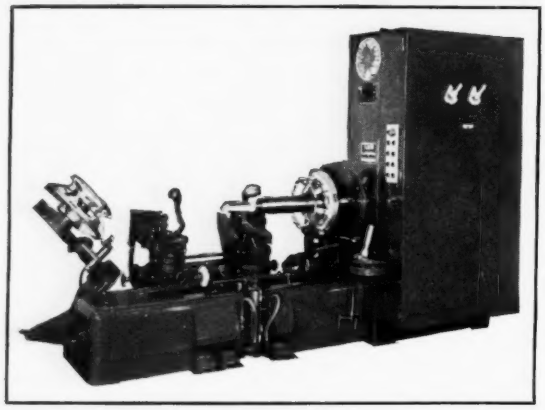
FOR TIRE BUILDERS...GREATER UNIFORMITY OF PRODUCT...INCREASED PRODUCTION

Tire building operations are being simplified with NRM's new automatic time-cycle control

The human element affecting quality of product as well as output is being greatly reduced in tire building operations. By replacing most of the manual functions with automatic operations, the *NRM Model 50 Sequence Timed Automatic Tire Builder* is today not only turning out more tires hour after hour but producing greater uniformity of product from tire to tire.



With the *NRM Model 50*, complete mechanical functions in the building of a tire can now be pre-set on a program drum. Outside of manually placing the leading ply end on the drum and splicing the ends of the ply and stitching the tread splice, the remainder of the tire building cycle is entirely automatic.

To simplify setup and provide means for easily modifying each operational cycle to suit the tire building needs, there is a separate timing adjustment for each station. This adjustment consists of a single electronic timing circuit with multiple timing potentiometers.

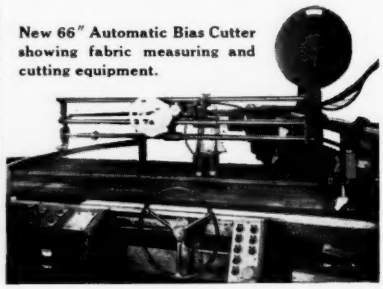
For setup purposes, a pushbutton selects any operation desired. The operator can also manually index the program drum to any station, to skip or repeat an operation where required. All operations are engraved on the drum, keeping the operator informed of the next function in the cycle.

Smooth acceleration for fast application of ply stock in one revolution of the drum without inching is made possible by a reversing two-speed AC high torque induction motor. High speed is used for all stitching operations. Adjustable torque is provided by tapped resistors in series with low speed connections.

In normal use, the operator need simply to depress the foot pedal starter control. From then on the sequence timer automatically takes over, completing from 24 to 30 functions as may be required in the construction of the tire. When desirable, the timer can be operated semi-automatically, eliminating the dwell function and requiring the operator to trip the foot pedal for initiating each automatic operation.

Automatic tools incorporated in the *NRM Model 50* include a pair of bead stitchers mounted behind the building drum. To stitch the fabric around the beads properly, the stitches are operated at two different pressures. Adjustment is provided sidewise for different width tires from minimum "shoulder set" to "21" and diametrically from 12″ to 20″.

The savings in tire manufacturing costs now possible with *Model No. 50 Automatic Tire Builder* are typical of the benefits you get from NRM's research development work. It will pay you to have NRM analyze your production problems. From their 30 years of creative engineering and actual manufacturing experience, it is likely they can suggest further ways of improving the quality of your products, of cutting your costs. Write now or wire National Rubber Machinery Company, 47 West Exchange Street, Akron 8, Ohio. No obligation.

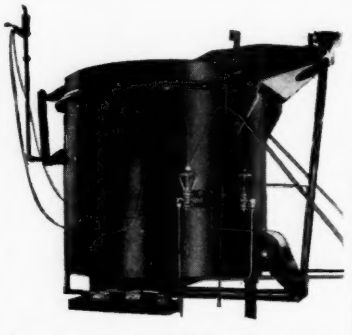


New 66″ Automatic Bias Cutter showing fabric measuring and cutting equipment.

NEW EQUIPMENT OPERATES BIAS CUTTERS AUTOMATICALLY

Completely automatic cutting of bias fabric for any pre-selected width from 10″ to 48″ is now being achieved with new electronic and mechanical equipment recently perfected by NRM. Accuracies of plus or minus $\frac{1}{32}$″ are being maintained with up to 20 cuts per minute, resulting in greater accuracy at less production cost.

Simple and foolproof in design, the new NRM control equipment can be readily adapted to your present as well as to new NRM Bias Cutters. For added safety, a built-in stop breaks the operating circuit when cut fabric is not removed from the end of the table. Complete details and specifications can be obtained simply by writing NRM.



Another example **of NRM's constant effort to reduce costs . . . the new 120″ Vacuum Expander for large tires, installed in a leading tire manufacturer's plant.**

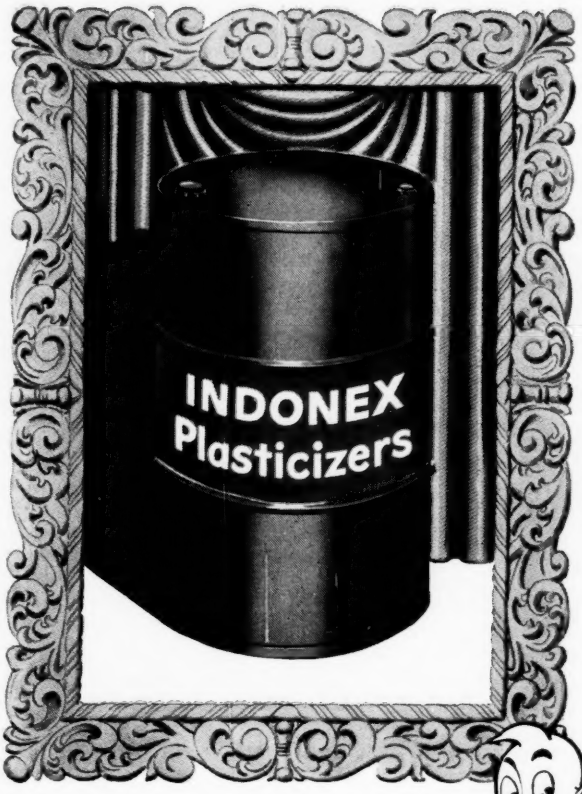
NATIONAL RUBBER MACHINERY CO.

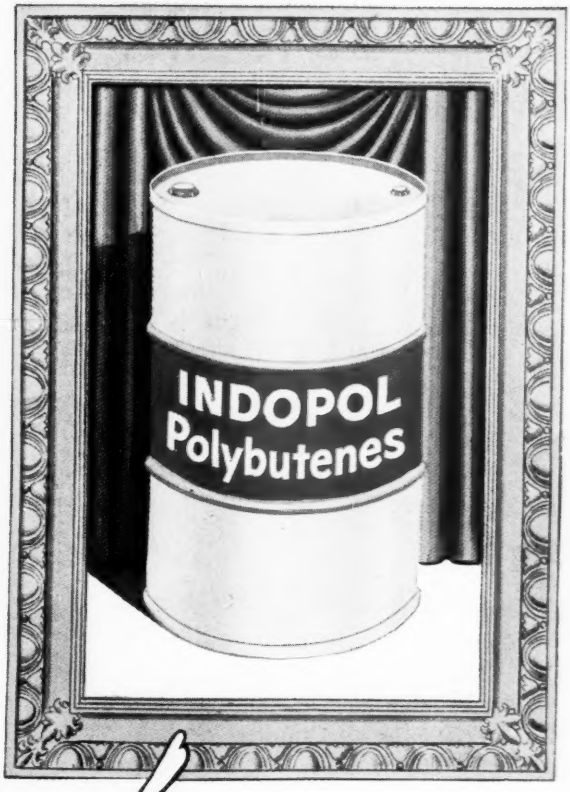
General Offices & Engineering Laboratories
Akron 8, Ohio

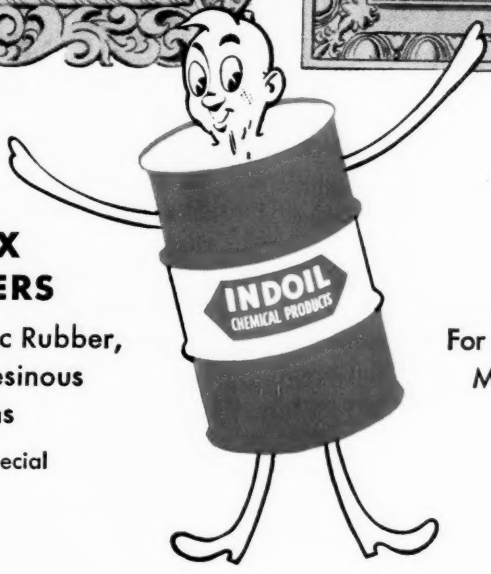
PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EUROPE Rubber Machinery: GILLESPIE & COMPANY
96 Wall Street, New York 5, N.Y.

Creative Engineering

Both worth looking at-







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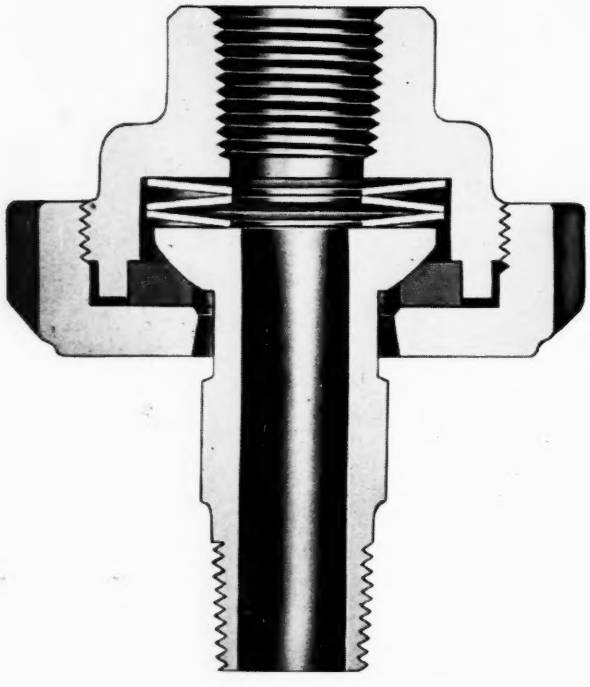

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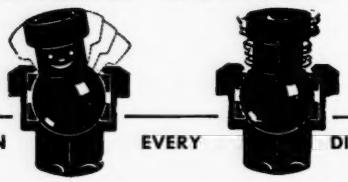

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3. Its *exclusive* types include the well-known Kadox and Protox brands.

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Founded 1848

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To Chief Engineer
Factory Manager
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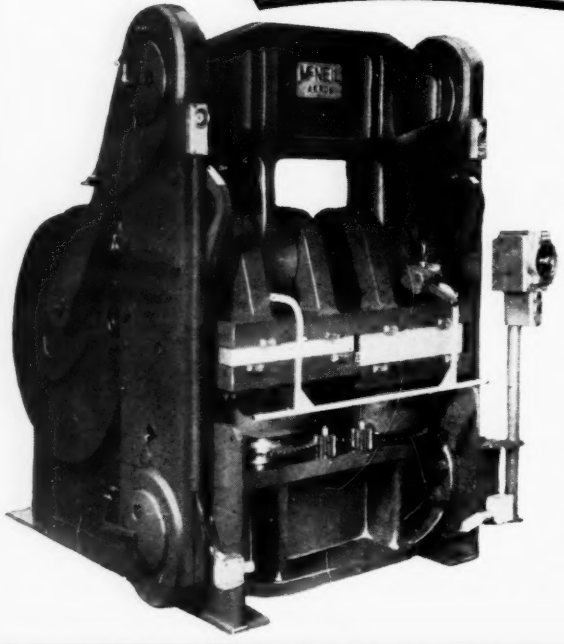

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- 800,000 POUNDS TOTAL PRESSURE
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- SIMPLE SPEEDY ADJUSTMENTS OF LOWER PLATENS
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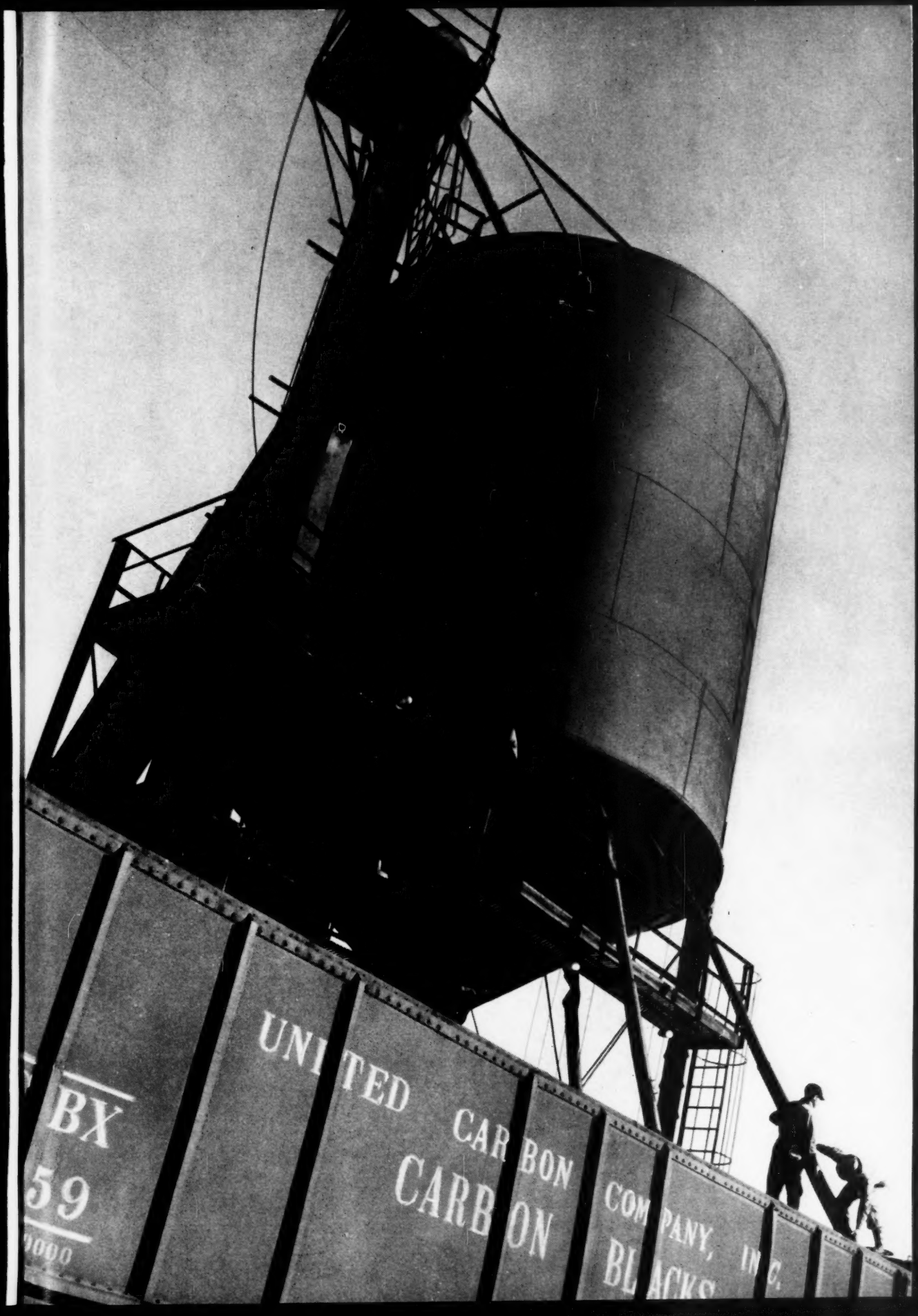
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UNITED BLACKS, made with engineering and scientific skill to meet the needs of the rubber industry, are "packaged" to suit the convenience of the user. In this photo a hopper car is being filled; distinctive United Carbon bags, plainly printed for ease in handling and selecting, are another medium which United uses to make handling convenient, fast, and easy for the user.

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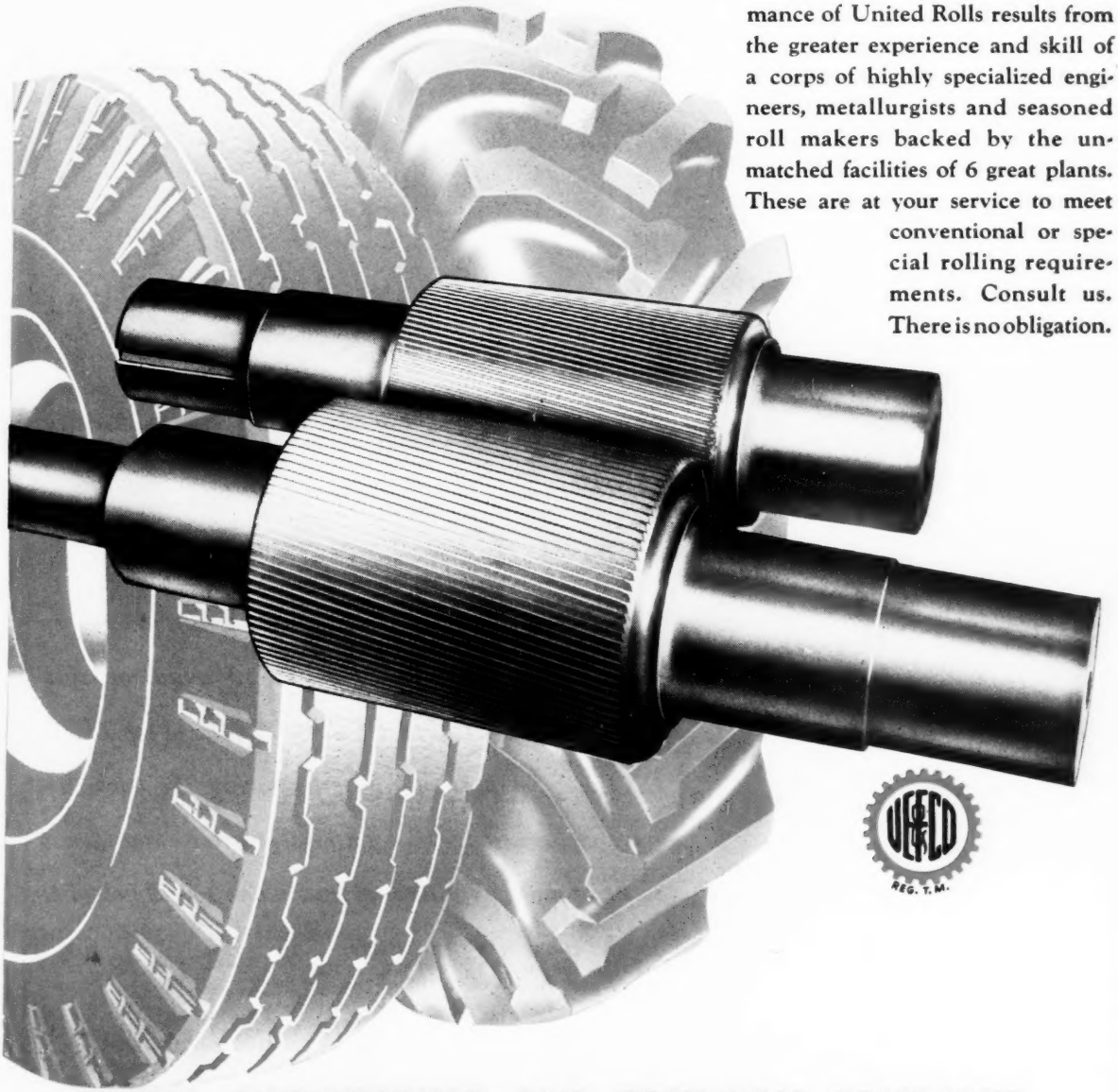

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CONTENTS

- A Short History of the St. Joseph Lead Company
- The Production of St. Joe Zinc Oxides
- General Properties of Zinc Oxide
- Zinc Oxide in Rubber Compounds
- St. Joe Rubber Grade Zinc Oxides
- Zinc Oxide in Protective Coatings
- St. Joe Paint Grade Zinc Oxides
- Zinc Oxide in the Chemical, Pharmaceutical and Other Industries
- Zinc Oxide in the Ceramic Industries
- St. Joe Ceramic Grade Zinc Oxides

As the table of contents indicates, this 55 page, illustrated book is a comprehensive manual on zinc oxides in general, and on ST. JOE Lead-Free ZINC OXIDES in particular. In preparing the book, we have included only that material which we considered to be of maximum interest and value to technologists in the consuming industries.

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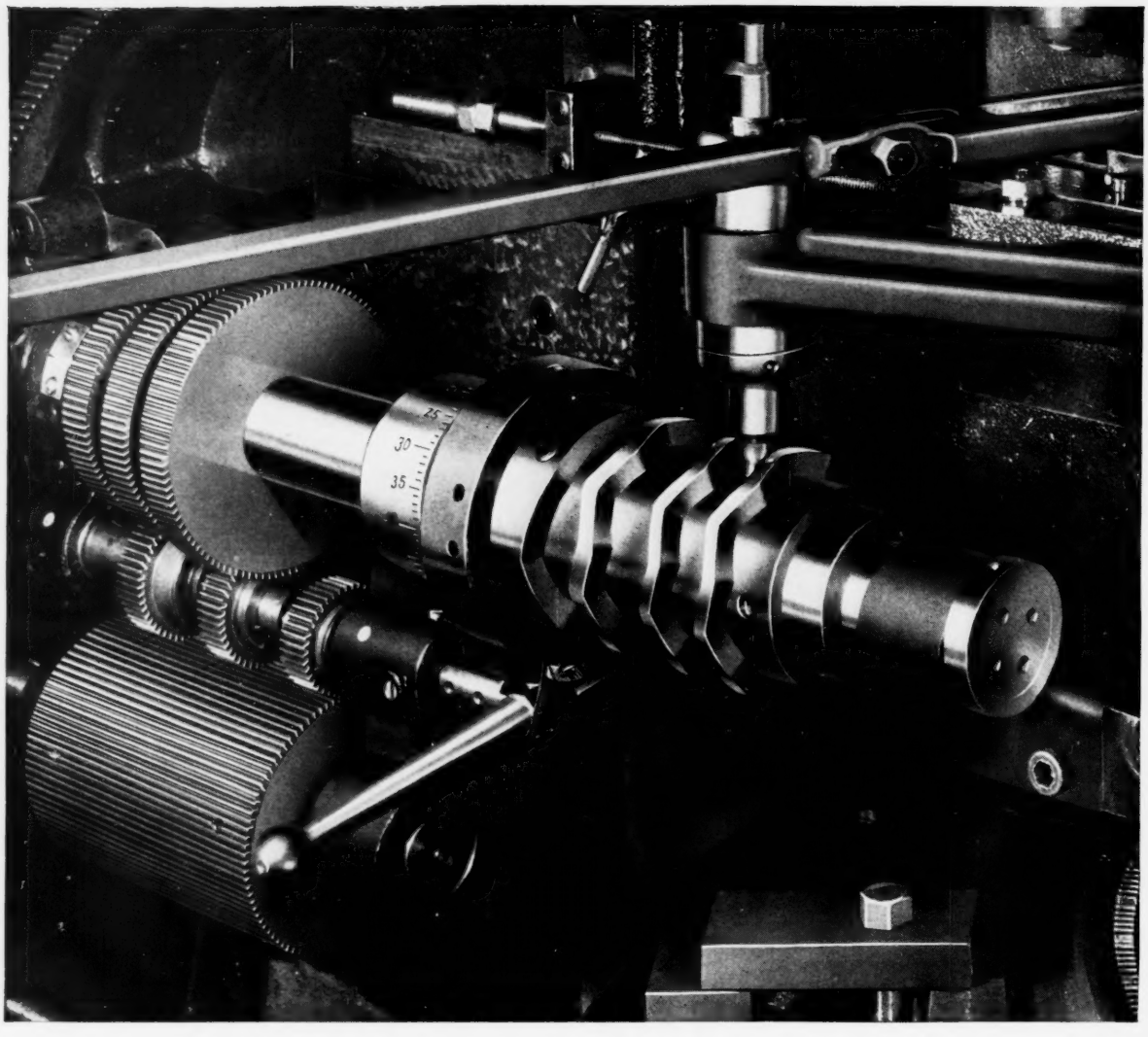

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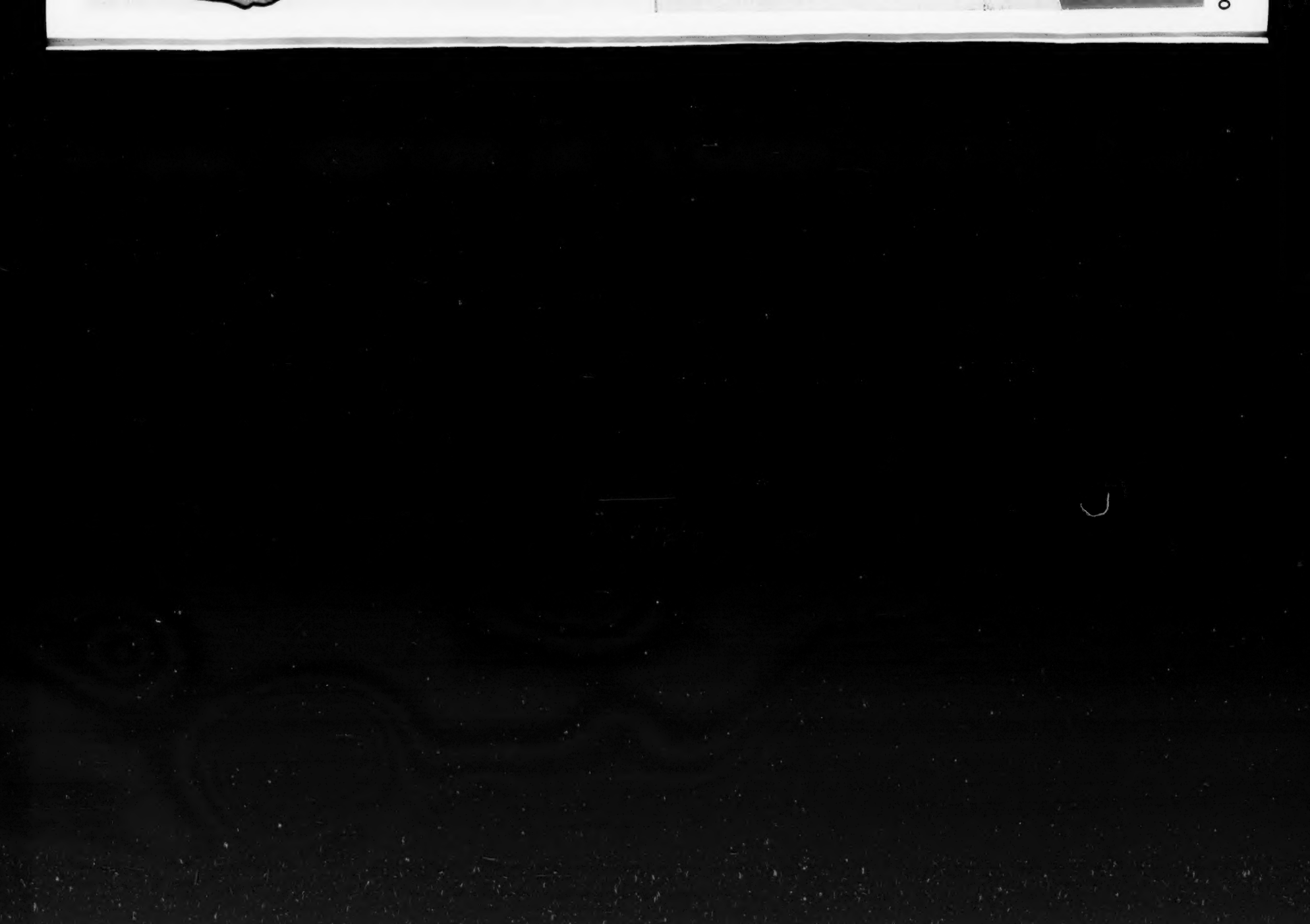

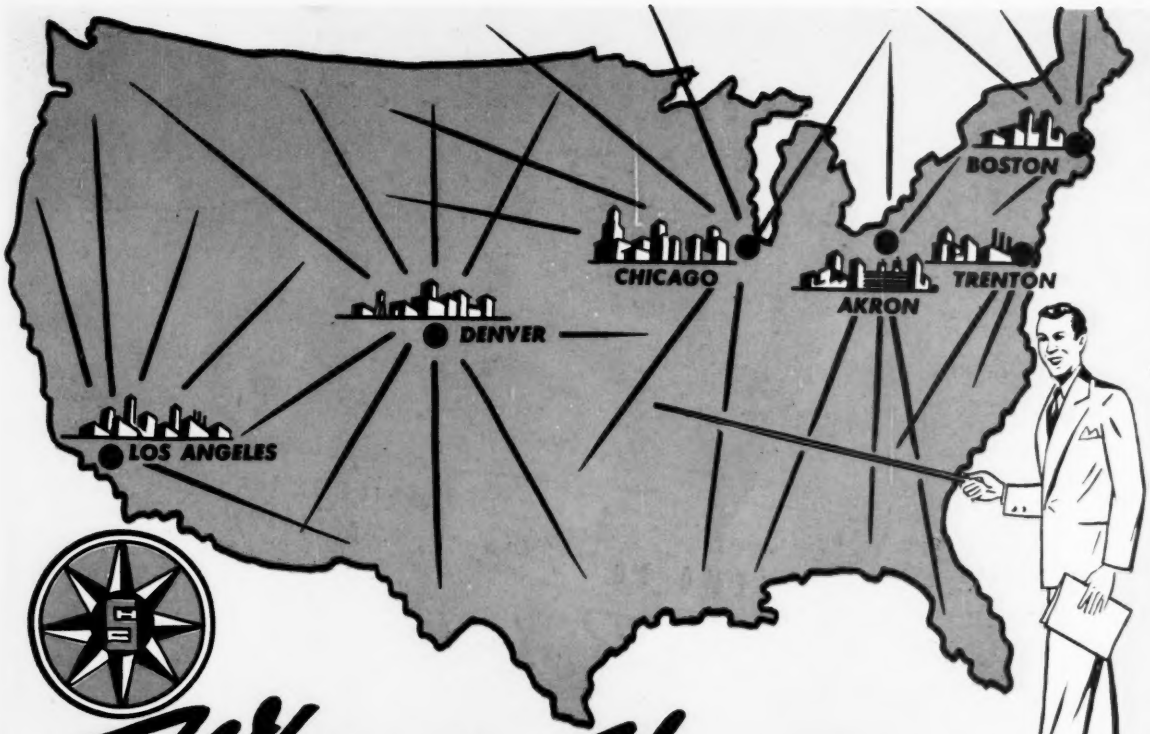

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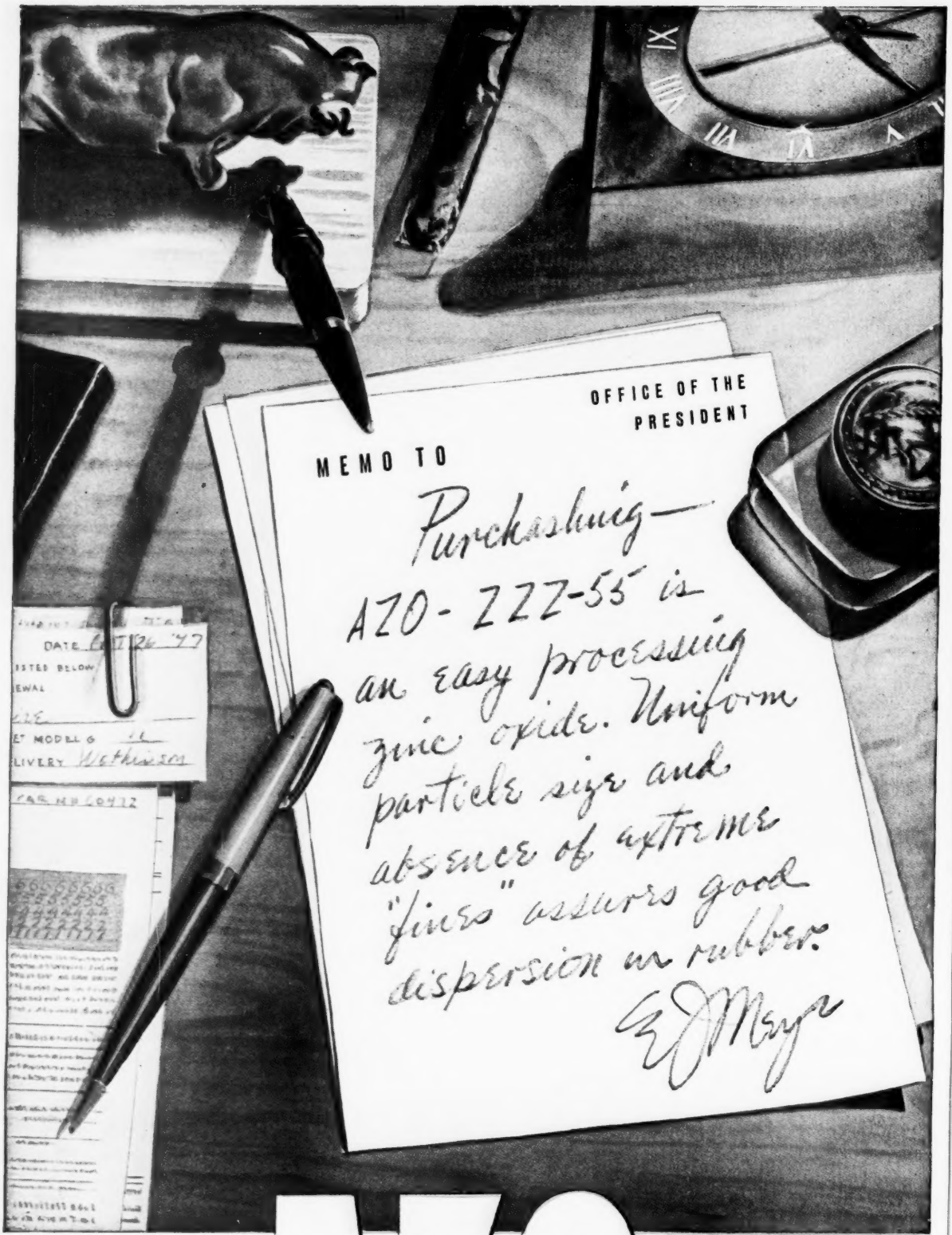

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ONE REASON . . .
The body of a chilled iron roll is formed by pouring molten metal into an iron mold or chill. Iron being a good conductor of heat, cooling is rapid, causing the surface of the roll body to "chill" and harden. The body of the roll below the chilled surface cools slowly, forming a gray iron structure which gives strength to the roll. Sand molds are used for the necks, and, since sand is a poor conductor of heat, the metal becomes a gray iron composition with physical properties which make the necks strong, yet readily machinable.
HOPPER FOR POURING
RUNNER
ROLL
FLASK
FLOOR LEVEL
CHILL
CASTING PIT
CHILL
FLASK
GATE
SAND

why Farrel-Birmingham Rolls *last so long*

The depth of the white iron "skin" or chill is one of the principal factors affecting the service life of a chilled iron roll.

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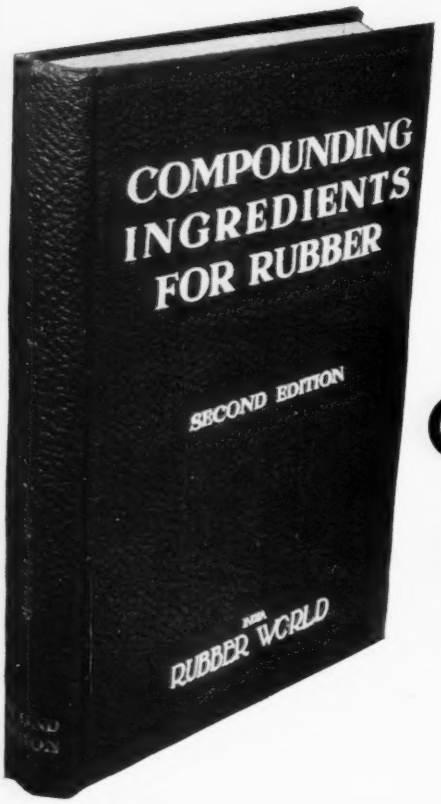

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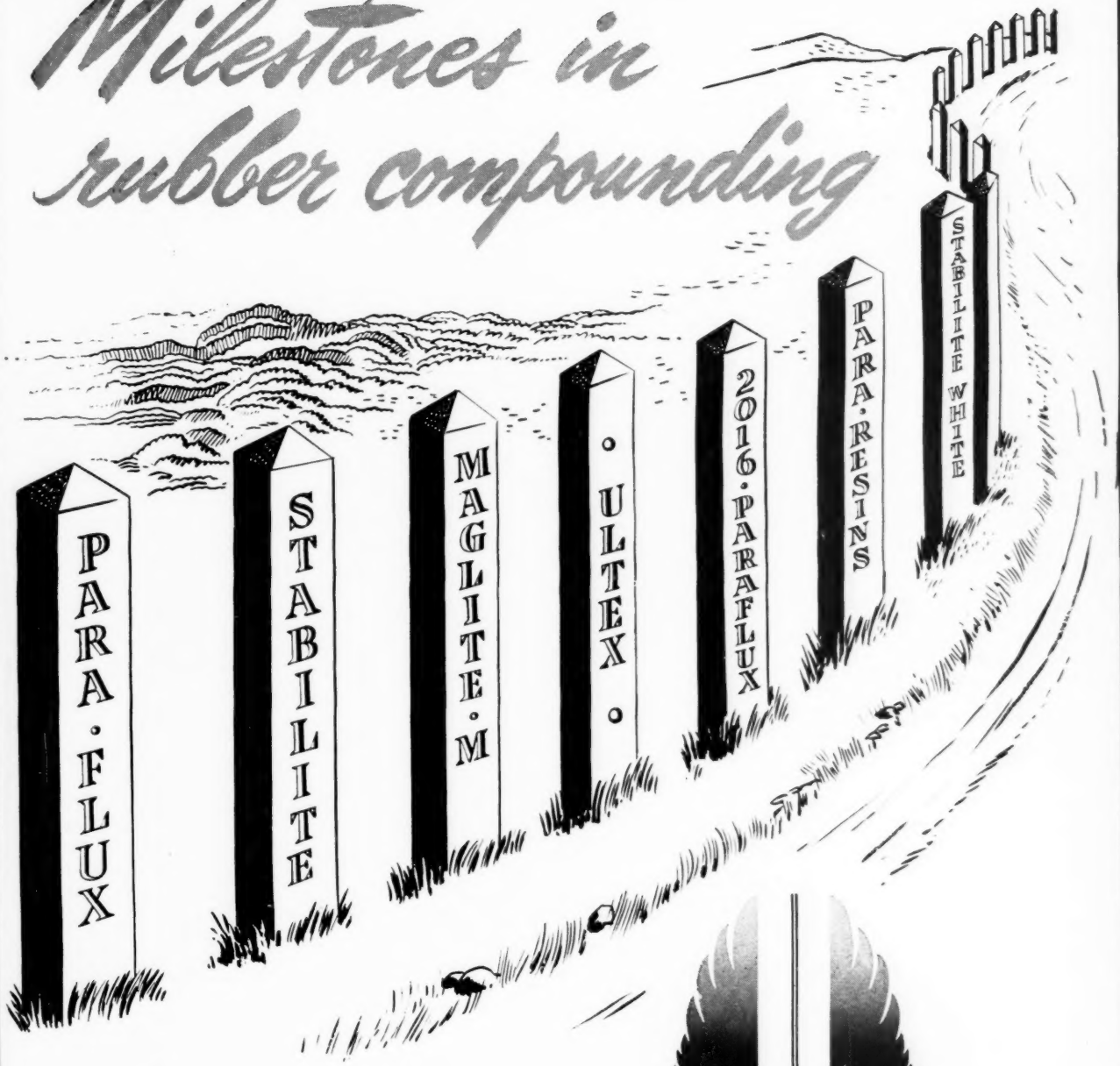

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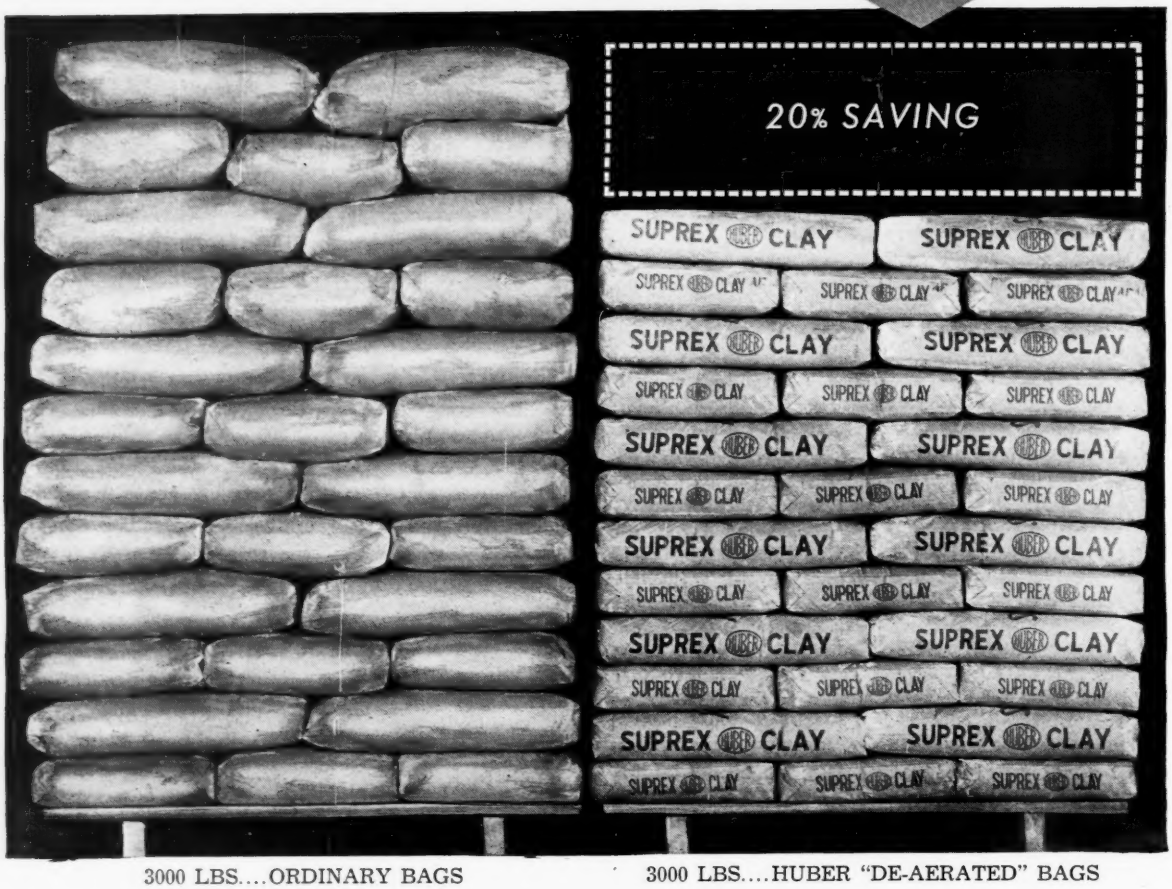

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The Optical Properties of Pigments as Related to Their Use in Rubber
C. E. BARNETT, H. C. JONES 45

Radio-Frequency Heat in the Rubber Industry—I
R. F. MILLER, W. L. WITTIG 51

Double-Screw Mixer
L. F. STREET 58

DEPARTMENTS

Editorials 57
Plastics Technology 58
Scientific and Technical Activities 64
News of the Month:
United States 65
Obituary 82
Financial 82
New Machines and Appliances 84
Goods and Specialties 88
Rubber Industry in Europe .. 92
Far East 96
Book Reviews 102
New Publications 104
Bibliography 106
Foreign Trade Opportunities 116
Statement of Ownership 116
ANNUAL INDEX 119

MARKET REVIEWS

Crude Rubber 112
Scrap Rubber 112
Reclaimed Rubber 112
Cotton and Fabrics 114
Rayon 114
Compounding Ingredients ... 116

STATISTICS

United States, for June, 1950 116
Imports, Exports, and Re-exports of Crude and Manufactured Rubber .. 118
Tire Production, Shipments, and Inventory 114

CLASSIFIED ADVERTISEMENTS 111

ADVERTISERS' INDEX 125

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RUBBER WORLD

Volume 123 New York, October, 1950 Number 1

The Optical Properties of Pigments as Related to Their Use in Rubber

C. E. Barnett[1] and H. C. Jones[1]

FOR the large-volume uses of rubber its color is an incidental characteristic. However the increasing demand for white sidewall tires and the general interest in white and pastel shades for footwear, mechanical and household rubber articles makes the discussion of the subject timely. There are a number of articles in the European journals, but these are limited to cataloging the usefulness of various coloring materials. The same type of information is supplied by the excellent technical bulletins of American color manufacturers. Special problems arise in the coloring of rubber because of the physical properties of the medium and the effect of the chemical reactions associated with the vulcanization process.

The color, brightness, tinting strength, hiding power, and other optical properties of pigments in paint-type media are determined by the light absorption, index of refraction, and particle-size characteristics of the pigments. Each of these physical properties will be discussed with reference to rubber as a vehicle for pigment colors. Absence of chemical reactivity between the color and the separate curative ingredients, as well as their reaction products, is fully as important as the optical properties of a pigment in determining its usefulness as a rubber color. This subject can be complex in itself because of the number of possible variables. Throughout the paper the word "pigment" will be used to mean a substance that imparts color (in the broad sense of the word). In the rubber industry the word has come to be more commonly associated with the influence of powders on the mechanical properties of rubber compounds.

Light Absorption

While rubber hydrocarbon is colorless, commercial pale crepe is amber to orange-yellow, and the color of smoked sheet is masked by its overall darkness. Wood (1)[2] has shown the transmission as a function of wavelength and sample thickness for vulcanized and unvulcanized pale crepe. Vulcanization actually increased the transmission at the shorter wave-lengths while decreasing it at the longer ones for his particular formula and vulcanization conditions. The data by Crabtree and Kemp (2) represent the more general case. Light absorption

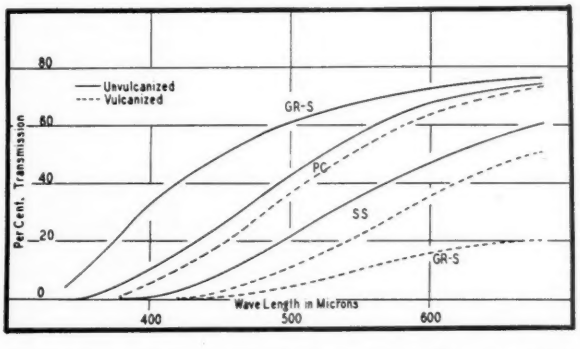

Fig. 1. Spectral Transmission Curves of Various Rubbers 0.05-Inch Thick

by rubber is increased on compounding and much more by vulcanization. Even a thin film of vulcanized rubber shows complete absorption of ultra-violet and nearly complete absorption of blue light; the color becomes more orange and darker on vulcanization. GR-S develops much higher absorption than pale crepe or smoked sheet, possibly owing to limited solubility of the curatives. Spectral transmission curves for the near ultraviolet and visible range are shown in Figure 1 for samples of milled smoked sheets, pale crepe, and selected GR-S before addition of compounding ingredients. Corresponding transmission curves are shown after formulation and vulcanization under representative conditions for transparent or white or light-colored rubber. As far as the use of pigments is concerned, the point is that in soft vulcanized or unvulcanized rubber the matrix shows selective absorption of blue light; the red end of the spectrum is selectively transmitted. It is important to consider the influence of this selective absorption of light on the color of pigmented compounds. Figure 2 is a simplified schematic diagram to illustrate this for the case of a non-absorbing (white) pigment.

In Figure 2, "*A*" represents a hypothetical white light consisting of equal luminosities of blue, green, and

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[2] Numbers in parentheses refer to Bibliography items at end of this article.

red light being reflected from a non-selective white plate covered with a colorless film. In this case the reflected light has the same spectral distribution as the incident light. "*B*" represents the conditions when the plate is covered with a yellow-colored film. Because of the selective absorption of blue light by such a film, red light predominates in the reflected radiation, which, therefore, appears yellow. In "*C*" the conditions are the same as in "*B*", except that a non-selective pigment has been added to the film. This decreases the penetration of light into the film so that the vehicle has less opportunity to manifest its selective absorption in the blue. As a result, the reflected light is greater in intensity than in "*B*," but the reflected radiation is still yellow.

"*D*" represents the ideal case. The pigment has its maximum efficiency in the blue region of the spectrum and therefore can reduce the penetration of blue light into the film and thus turn the blue out of the film before it can be absorbed by the vehicle. At the same time the greater general opacity of the pigment reduces the overall penetration of incident light more than in "*C*", therefore decreasing the opportunity for selective absorption of blue light by the vehicle. As a result of these factors, the reflected light, although reduced somewhat in intensity by absorption of the vehicle, will tend to retain the same spectral distribution as the incident light.

To the extent that the ebonite reaction progresses during vulcanization the overall absorption of light by the matrix will increase, and the resulting darkening may be strong enough that the pigment is working in a black rather than an orange-yellow medium. Many rubber antioxidants light darken to the extent that special antioxidants are customarily used in white and light-colored rubber. Some grades of neoprene seriously light darken on exposure to sunlight. In spite of this limitation the sun-check resistance of neoprene is so superior to that of natural rubber that 50-50 blends of neoprene with natural rubber are being successfully utilized in white sidewall tire compounds.

Figure 3 shows the effect of vulcanization on the colors of white, blue, green, and red rubber compounds. The white compound was the base mix for the respective colors. Vulcanization decreases the reflectivity of the white compound, throughout the spectrum. There is a greater decrease in reflectivity in the blue region than in the red, as would be expected from the preceding discussion. By contrast, vulcanization results in very little change in the blue, green, or red compounds. The small differences that exist in the curves are not apparent on visual examination. They are probably due to differences in surface reflection and texture since it is difficult to obtain the same degree of gloss from both surfaces. In Figure 3 the reflectivities of the unvulcanized colored compounds are below that of the vulcanized white mix at all wave-lengths, or, expressed in another way, the absorption of light by the coloring material exceeds the absorption in the vulcanized base mix. Under these conditions vulcanization would not be expected to alter the color unless there were some specific reactivity of the color pigment during the process.

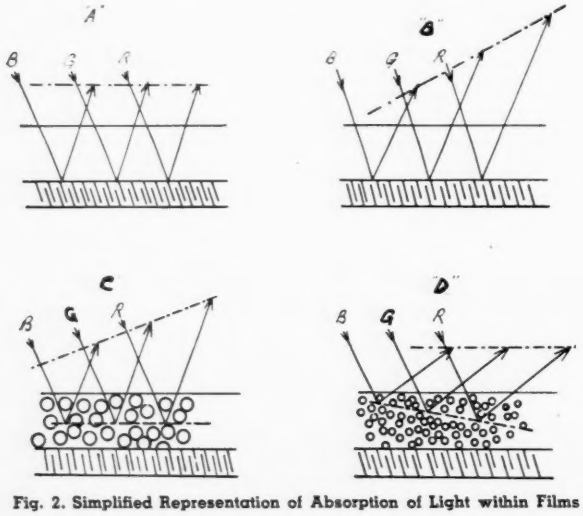


Fig. 2. Simplified Representation of Absorption of Light within Films

A number of people have studied the behavior of mixtures of colors. Duncan (3) and Saunderson (4) have presented this work in the most usable form. When colored pigments are mixed, the effect is subtractive rather than additive as when colored lights are mixed. The absorption of the separate pigments are added together to produce the color of the mixture. Thus the green resulting from the mixture of blue and yellow pigments is a consequence of the fact that green is the only color reflected by both pigments. Light of any other color is absorbed by either the blue or yellow and hence by the mixture. Saunderson studied the colors of pigment mixtures in polystyrene, and his work should be the most applicable to the color of rubber compounds. The difference is that polystyrene is a colorless media and its absorption can be taken as zero. Because of the color of vulcanized rubber it is necessary to introduce an absorption coefficient for the medium into the equations.

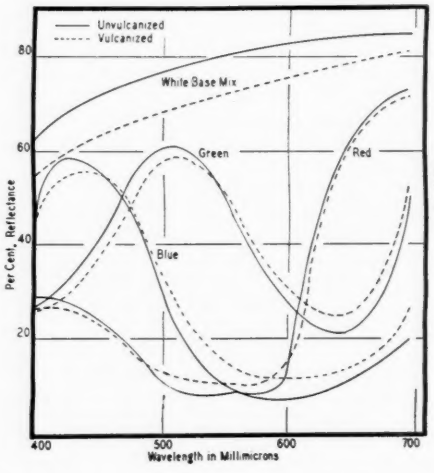


Fig. 3. Effect of Vulcanization on Colored Rubber Compounds

The absorption coefficient can be evaluated from transmission measurements on the base mix, but it does add another complication to the calculations. The calculations for mixtures of colors in rubber could probably be simplified by considering the rubber compounded with the white pigments as the base mix for the addition of colors, instead of only the rubber plus curatives. This condition would only apply as long as the formulation and vulcanization conditions for the mix were constant. Duncan was unable to obtain satisfactory results for bituminous paints owing to the dark color of the medium, and it would hardly be expected that the colors in ebonite could be calculated with suitable accuracy.

Absorption of radiation in the ultra-violet and infra-red regions of the spectrum is an important property of pigments, though not directly related to their visible colors. Ultra-violet absorption is important in the protection that the pigment provides against the destructive influence of ultra-violet on organic media. It can also

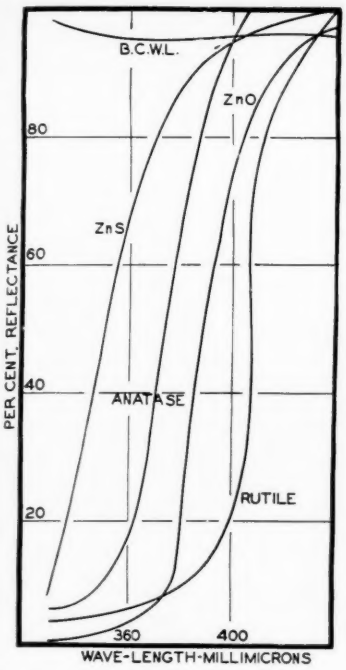
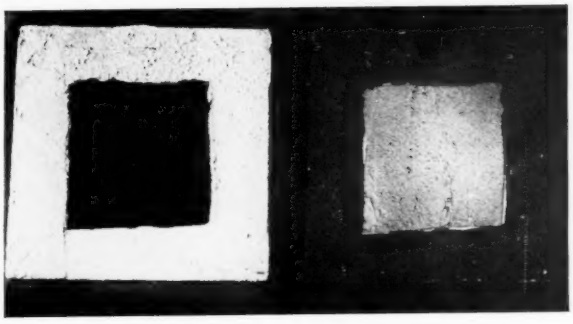


Fig. 4. Ultra-Violet Reflectance of Some White Pigments

(Below)

Fig. 5. Zinc Oxide *(Outside)* and Lampblack *(Inside)* in Visible and Ultra-Violet Light: *(Left)* Visible Light, *(Right)* Ultra-Violet



be the source of troublesome photochemical reactions. It has additional importance because the index of refraction increases to high values on the long wave-length side of an absorption band. Those pigments, therefore, which have absorption bands in the wave-length ultra-violet will show an increase in index of refraction on going from red toward blue in the visible spectrum. This tends to increase the efficiency of the pigment in the blue relative to the red as diagrammed in Figure 2, "*D*".

Pfund (5) and Stutz (6) have shown that most of the high-strength white pigments have absorption bands in the ultra-violet (Figure 4), which in some cases may cut slightly into the visible spectrum. Thus some of our best white pigments narrowly miss being colors.

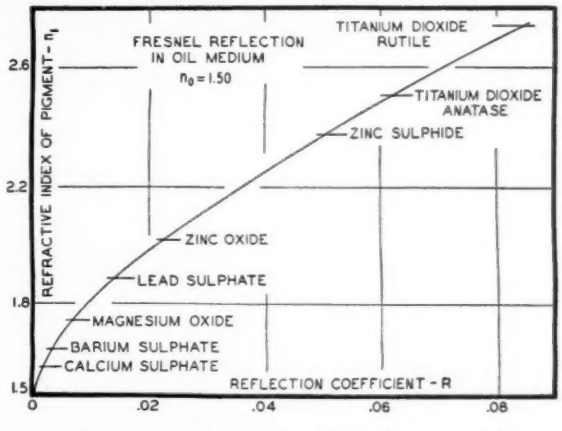
The potency of the effect is illustrated in Figure 5, which shows white and ultra-violet (3650 Å) photographs of zinc oxide and lampblack paints. In the ultra-violet the white pigment is blacker than the black. The black, furthermore, is considerably lighter in the ultra-violet than in the visible. This condition is the result of selective scattering of ultra-violet light by the fine particles of carbon black, although the sensitivity of the photographic emulsion to the ultra-violet as well as the development reaction probably exaggerates the difference. The result cannot be obtained with just any zinc oxide and black pigment. The fluorescence of most zinc oxides, when irradiated with 3650 Å ultra-violet radiation, is sufficient to expose the photographic emulsion, and not all black pigments are fine enough for selective scattering to occur in the ultra-violet. The contrast should be even greater if shorter wave-length ultra-violet were compared with visible light.

The desirability of strong ultra-violet absorption in a pigment has been questioned many times, most recently by Crabtree and Kemp (2) in their study of the weathering of soft vulcanized rubber. They measured the gain in weight of vulcanized rubber samples as a function of the exposure to an S-1 sunlamp. The compounds divided into three groups, according to whether the filler had (1) low refractive index, (2) high refractive index, or (3) was carbon black.

"In the second group the initial rate of oxidation is greatly reduced, a logical result of the opacity and the highly reflective properties imparted by the fillers of high refractive index (zinc and titanium oxides); the light activated oxidation is thus confined to a very thin film at the surface. As oxidation proceeds, however, some disco'oration takes place at the surface, and the rate of weight increase actually exceeds that of the more transparent compounds. In the case of the white wire insulation, the end of the exposure period found the sheet embrittled throughout the entire thickness while the side

(Below)

Fig. 6. Reflectance Coefficient *vs.* Index of Refraction of Some White Pigments



> wall compound was in similar but somewhat better shape. Light penetration, however, had occurred only to a small fraction of the total depth as evidenced by the degree of discoloration in a cross-section of the sheet . . . It is possible that peroxidic substances formed in the illuminated zone at the surface may migrate into the mass of the rubber and there catalyze its oxidation. Or perhaps the accelerated rate as compared with the unfilled rubber may be attributed to the zinc and titanium oxides which are well-known photosensitizers. A photosensitizer is any substance capable of absorbing light and conveying the energy so absorbed to the reactants, and, thus of increasing the efficiency of the photochemical process."

Crabtree and Kemp apparently want the pigment to be highly reflecting in the early part of the exposure and highly absorbing at the end. The destructive action of light is generally ascribed to the ultra-violet component, and we have just shown that zinc oxide is not a reflecting, but an absorbing pigment for ultra-violet radiation. It is black in the ultra-violet in the same sense that carbon is black in the visible spectrum. Rutile titanium

dioxide is almost as black, but the anatase form is appreciably less absorptive. The question is what happens to the absorbed radiation. The absorption of a light quantum by an atom of the crystal may raise an electron into the conduction band of the solid or to an excited state from which it may fall directly back to the ground state with the emission of visible or heat radiation, or it may be trapped in a metastable state. The absorbed quantum can be degraded to heat, can be remitted as fluorescence or phosphorescence, or be available for catalysis while in either the trapped or excited state, or in the process of returning to the ground state.

If the hypothesis that zinc oxide photosensitizes the oxidative decomposition reactions is correct, then fluorescent zinc oxide should result in less decomposition because the absorbed energy is reradiated as visible light. Experiments to answer this point have been inconclusive. In exterior paints one finds real advantages in resistance to fading, chalking, checking, and cracking for films containing fluorescent zinc oxide compared to non-fluorescent zinc oxide of comparable purity and particle size. Except in tint retention there is no advantage over the finer particle-size grades of zinc oxide regularly used in exterior paints. Three months' exterior exposure of unstretched white rubber compounds in which zinc oxide was the major pigment showed no significant difference in stress-strain, reflectance, or checking between fluorescent zinc oxide and non-fluorescent control pigment of the same purity and particle-size characteristics. The compounds also showed the same rate of increase in weight when exposed to an ultra-violet light aging test.

Index of Refraction

Next to light absorption, index of refraction is the most important property in determining the optical characteristics of pigments. The basis for the effect of index of refraction is given by the Fresnel equation relating the intensity of the reflected light at the interface between a medium of refractive index n_1, immersed in a medium of index n_0

$$R = \frac{(n_1 - n_0)^2}{(n_1 + n_0)^2}$$

where R is the reflection coefficient or fractional part of the incident light that is reflected.

Figure 6 is a plot of the reflection coefficient for pigments of different indices immersed in an oil medium of refractive index 1.5. It is obvious from this relation that to prevent transmission of incident light, fewer individual reflections will be required in the case of a high-index pigment than for a low one. The point has previously been made that it is the efficiency of these pigments in preventing transmission of blue light that is of greatest importance in determining their ability to whiten rubber.

Wood and Tilton (7) recently determined the refractive index of rubber at different wave-lengths. This increases from 1.5191 for the yellow (sodium line) to 1.5363 for the blue (4358 Å mercury line). The corresponding values for anatase TiO_2 are 2.4880 and 2.6576. The ratios between the indices of this pigment and rubber (m) at the two wavelengths would be 1.635 and 1.728. Thus from this cause the efficiency of the pigment would tend to increase on passing from yellow to blue light. The corresponding ratios for calcium carbonate (Calcite) are 1.098 and 1.091. In this case the increase in the index of the pigment between yellow and blue light is less than that of rubber, and the pigment would be less efficient in the blue than in the yellow.

In paint technology the index of refraction of white pigments is of importance because paints are applied in very thin films that must hide a dark background. Pigment hiding power, in this limited sense, is less important in rubber articles which are generally molded at such thickness that there is little transmission of light regardless of the pigment and are rarely called on to hide a dark background. The major effect of pigment refractive index is thus confined to the color and brightness of the article. This, in turn, is determined by the ability of the pigment to turn back light before it can be absorbed by the rubber. However there are many instances where colored articles must have as nearly as possible the stress-strain characteristics of gum rubber. This condition can only be effected with small additions of pigment of the greatest optical efficiency.

Particle Size

In a discussion of the size of a particle with respect to its optical behavior, the wave-length of light is the comparison standard. Thus a particle is large or small, depending upon whether the diameter is large or small compared to the wave-length of the light in which it is being examined. The basic studies of the whole range of particle size—from $d > \lambda$ to $d < \lambda$—were made by Mie(8) in 1908. In the intervening years there have been many further contributions to the subject.

The most helpful step in recent years, from the standpoint of practical use of the Mie theory, has been the calculation of tables of scattering intensities by the National Bureau of Standards Mathematic Tables Project (9). These tables give the angular distribution of intensity and the total light scattered by small spherical particles as a function of the ratio of the particle diameter to the wave-length of the incident light. The tables were prepared in connection with screening smoke investigations conducted during World War II. The theoretical scattering curves resulting from these calculations are specific for the relative refractive index [$(m) = n_1/n_0$ of Equation 1] of particle and surrounding medium for which they were calculated. However it was found by Bailey (10) and confirmed by LaMer (11) that if the ratio of particle size to wave-length (d/λ) was multiplied by a refractive index term the resultant scattering curve was independent of the refractive index of the particles or the medium. The resulting universal scattering curve is reproduced in Figure 7.

The abscissa in Figure 7 represents the variation in particle diameter, d, multiplied by the refractive index factor, $m^2 - 1/m^2 + 2$. The calculation has been made for a constant wavelength, $\lambda = 0.52\mu$. The ordinate K expresses scattered energy in watts per unit of cross-sectional area per gram for one watt per square centimeter illumination. For very large particles (d/λ large), the scattering coefficient, K, has a very low value, but increases continuously as d becomes smaller. Light is specularly reflected from the particle surfaces, and the angular distribution of the reflected light will lack the uniformity needed in a white pigment. At the other extreme, when d has become small with respect to λ, the particle behaves according to Rayleigh's scattering law. The value of K drops rapidly to a very low value; the particle shows selective scattering with respect to λ, and the optical efficiency becomes low, so that non-absorbing particles in this range are too fine to make good pigments in the optical sense. Between these two processes is a transition zone in which the individual particles are much more efficient optically than in either of the extreme regions. Non-absorbing pigments with particle size corresponding to the Rayleigh region are used in transparent rubbers, because of their low optical efficiency. In the

case of activation zinc oxide in transparent rubber formulae, there is a double advantage in very small particles —low opacifying power and high chemical activity. Reflection maxima or transmission minima corresponding to that shown in Figure 7 have been shown experimentally by Stratton and Houghton (12) for water drops in air, by LaMer and others (11, 13) for sulfur sols and smokes, and by Pfund (14) and DeVore (15) for pigments. The essential condition is a high degree of uniformity and correct fineness of particle size if the phenomenon is to appear in the visible region.

It is well known that the color tone of black pigments is a very sensitive function of their fineness. As the particle size of a black is decreased, the undertone color shifts from yellow to blue. A pigment whose particles are small enough to be within the range in which Rayleigh scattering predominates will selectively scatter blue light when the incident light is white because in the Rayleigh

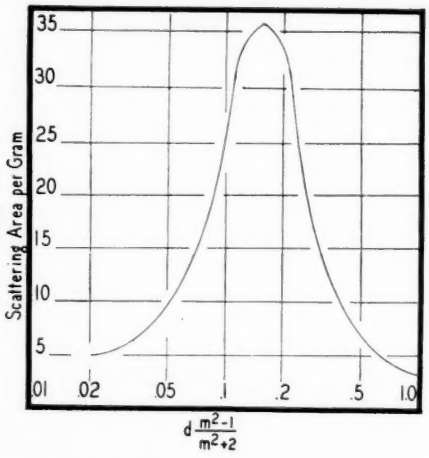


Fig. 7. Universal Scattering Curve

region the intensity of scattered light increases as the wave-length of the light decreases. The same phenomenon of selective scattering is found in white as in black pigments, but is not so easily perceived. The explanation is simply that the strong absorption by the black prevents the dilution of the scattered light. Consider two films, one black and one white, and assume that the pigments in each are of the right size to scatter 3% of the incident light. In the white film the 97% remaining is passed on to successive layers inside the film, but all of it must eventually be turned back out of the film. Assuming no absorption, the appearance will be little affected by the scattered light. The black, however, absorbs the 97% remaining, and the only light getting out of the film is that which is scattered by the surface layer of pigment particles.

There has been a great deal of work on methods of measuring the particle size of rubber pigments, because of the importance to the reinforcing action of pigments. In the early 1920's, Green (16), Dunn (17), Allen (18), and others worked out methods for examination and measurement of the particle size of pigments with the light microscope. Loveland and Trivelli (19) and Hatch and Choate (20) developed the statistics of size frequency curves and the relation to chemical reactions yielding precipitates. In 1930, Haslam and Hall (21) applied the ultra-violet microscope to pigment problems. This improved resolving power slightly and has been useful in distinguishing the components of mixed pigments. Gehman and Morris (22) in 1932 described a method using dark-field illumination to measure the average size of pigments. Carman (23) in 1938 related the surface area of a powder to the rate of flow of liquid through a plug of the powder of known porosity. This "permeability" method was adapted to gases by Askey and Feachem (24) and has been studied by many investigators (25). In 1935, Emmet and Brunauer (26) proposed the evaluation of the surface area of powders from the adsorption of nitrogen at low temperatures. The method has received a great deal of attention in recent years. The electron microscope (27) was made available as a standardized instrument in the late 1930's. For the first time, it became possible to observe the true crystalline form of pigment particles and to be confident of the measurements on fine pigments.

The trend of most of the particle-size work over these years has been toward methods which are more sensitive to very fine particles. A zinc oxide having a surface mean diameter of 0.8-micron, as measured by the light microscope, is found to have a surface mean diameter of 0.3-micron by the electron microscope or by gas adsorption.

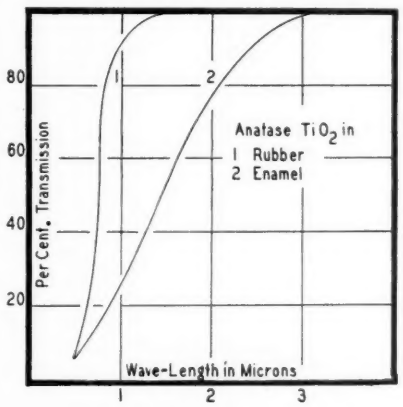


Fig. 8. Spectral Transmission Curves Showing Pigment Dispersion in Natural Rubber and Paint

This emphasis on fine particles has been essential in the case of certain colored pigments and carbon blacks. At the same time it has resulted in a concentration of attention on the very small figures in microns that represent the average particle size of pigments. This has occurred with some neglect of the at least equally important factors of distribution of particle size, number of coarse particles, and effective particle size in a given medium. Most pigments contain a few coarse particles or aggregates of particles. If these are not broken up during incorporation of the pigment into the vehicle, they will have a disproportionate harmful action on the optical and mechanical properties of the compound. The methods required to incorporate pigments into solid rubber are very effective in breaking up pigment aggregates. Nevertheless measurements which show the undispersed particles, such as that of Roninger (28), and the size characteristics of pigments, as they exist in the specific medium, are of greatest importance. Considerable work has been done on methods of measuring the particle size characteristics of pigments as they exist in actual dispersion in paints, rubber, and plastics. Bailey (10) and Gamble and Barnett (29) have approached the problem from light scattering methods. Martin (30), Jacobsen and Sullivan (31), and Parkinson (32) have used centrifugal sedimentation methods to evaluate the "effective" particle size characteristics of pigments. These methods involve dissolving the rubber compound and question of possible changes in the dispersion of pigment from that of the solid stock. It may be possible to solve this problem for most pigments with the electron microscope. Such studies in vulcanized rubber have been complicated by the difficulty of preparing mounts that are thin enough

to be transparent to the electron beam. Ladd (33) has proposed the vulcanization of a thin wedge-shaped film, and Fullam and Gessler (34) the use of a high-speed microtome to prepare sections of rubber compounds sufficiently thin for the electron microscope.

Figure 8 shows the wide difference in effective particle-size characteristics of a representative white pigment in a high-grade enamel dispersion and in rubber. The significance of these spectral transmission curves has been discussed in one of the above references (29). The rubber dispersion is much more uniform in respect to the effective size of the pigment particles, as indicated by the much greater slope of the selective portion of the curve.

Chemical Reactivity

The darkening of rubber during vulcanization due to the formation of rubber sulfide has been discussed in a preceding section. While this is the consequence of a chemical reaction, the result is the same as though an additional light absorbing material were added to the mix. Specific chemical reactions during vulcanization are possible between pigment or impurities in them with accelerators, sulfur, hydrogen sulfide, and moisture or acidic or alkaline materials both within the compound and in the atmosphere of the vulcanizer. Prior to 1940 there were frequent literature discussions of the chemical stability of colors in rubber compounding. Modern acceleration with short curing times has greatly reduced both the problem of specific reactivity and the darkening due to rubber sulfide. The quality of pigment colors has also been improved, and the net result is that the subject has quite completely disappeared from recent literature. This disappearance does not mean that color laboratories have no problems connected with the use of colors in rubber, but only that the results of the work are seldom published.

When one comes to the question of specific vulcanization reactions involving pigment colors, it is again surprising to find so little published information. This is in spite of the fact that the analyses of some of these make exciting problems. The reflectance of stocks pigmented with zinc oxide containing lead oxide as impurity provides a good example of the nature of chemical reactions between pigment and other constituents of a rubber compound. Under the conditions existing during hot vulcanization, there is a strong tendency for lead oxide to react with active sulfur or hydrogen sulfide to form lead sulfide, which is such a dark compound that its presence is easily noted. The interesting point is that there are also a number of conditions that tend to prevent the formation of lead sulfide. For example, in American process zinc oxide the lead oxide has been converted to basic lead sulfate. This compound is white and inert to ordinary vulcanization conditions, although it is sometimes possible for alkaline materials in the compound to neutralize the sulfur trioxide and free the lead oxide for reaction with sulfur. There is a definite ratio between the lead oxide content of zinc oxide and the sulfur trioxide required to convert it to basic lead sulfate and thus maintain a white compound during vulcanization. If the lead oxide content is very high, this will require so much sulfur trioxide that the pigment will have a retarding effect on cures. In the presence of zinc silicate or zinc titanate, appreciable amounts of lead oxide can be present without formation of lead sulfide during vulcanization. Apparently these substances are more reactive than lead oxide with hydrogen sulfide, and the products of the reaction are a white sulfide and oxides.

The formation of lead sulfide during vulcanization is also retarded in the presence of thiuram accelerators. These are converted to dithiocarbamates during vulcanization (35), taking up hydrogen sulfide in the process. The hydrogen sulfide used in this reaction is not available for reaction with lead oxide. The dithiocarbamates react with lead oxide in preference to zinc oxide, forming lead dithiocarbamate which is light-colored and insoluble in rubber at vulcanizing temperatures. Since the zinc dithiocarbamate is the active accelerator salt, this way is not practical to avoid the formation of lead sulfide. All of the cases cited in this section involve competing chemical reactions. They follow the general rule that the reaction resulting in the more insoluble and more stable products will dominate the system.

Summary

The pigment variables which determine the color of vulcanized rubber are light absorption; index of refraction; size, shape and dispersability of pigment particles; and chemical reactivity either due to the chemical constitution of the pigment or the presence of reactive impurities. Light absorption is the principal variable in the rubber phase. This is found in the rubber itself and is intensified by the rubber-sulfur reaction during vulcanization and in specific cases by reactions involving curative agents and antioxidants during the vulcanization and subsequent aging of the rubber. Reactions among compounding ingredients or impurities in them may radically change the absorption of light by the system. The net result is that a small amount of impurity can ruin a white or colored compound in spite of careful attention to the other factors.

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Radio-Frequency Heat in the Rubber Industry—I

Application of Dielectric Measurements to the Radio-Frequency Heating of Rubber-Like Materials.....

R. F. Miller[1] and W. L. Wittig[1]

RADIO-FREQUENCY energy has been used as a source of heat for many years in the plywood and plastics industries and for drying purposes. Its acceptance by the rubber industry has taken considerably longer. The reason for this difference lies in the way the energy is absorbed by these different materials. In many rubber compounds the energy absorption actually increases as the temperature increases so that any slight non-uniformity in temperature is thereby aggravated. In other rubber compounds the heating is too slow at even the highest commercially available frequencies. Accordingly it has been necessary to develop special compounding techniques for rubber compositions which are to be heated or vulcanized by radio-frequency energy. In wood and plastics applications, particularly Bakelite, the heating rate is adequate at the lowest frequencies. In many applications, especially that of drying moisture from products, the heating decreases with a decrease in moisture content, and the process is therefore self-regulating.

BRIEF HISTORY OF RADIO-FREQUENCY HEATING. In 1935 and 1936 two Frenchmen, René Alphonse Dufour and Henri Auguste Leduc, filed six applications which later resulted in patents[2] on the ideas of flowing, baking, or vulcanizing India rubber or similar materials by means of a radio-frequency field. These investigators foresaw at least the curing of rubber rolls and tires both solid and pneumatic. Dufour and Leduc had worked at frequencies "of at least approximately one million cycles per second and eventually higher." The Kassner patents[3] dating back to 1931 touch on this problem somewhat, describing means for altering the energy content of dipolar materials. However most of the work he reported specified frequencies about 150 million cycles per second.

Uses of Heat in the Rubber Industry

In the rubber industry, heat is used in a variety of ways to fabricate rubber compounds and products. Probably the most important direct application of heat is that in the vulcanization process.

The role that heat plays is shown in Figure 1. Ordinary vulcanization of natural and synthetic rubbers involves the application of heat energy to increase the temperature of the rubber about 200° F. Like other chemical reactions, vulcanization proceeds at faster rates as

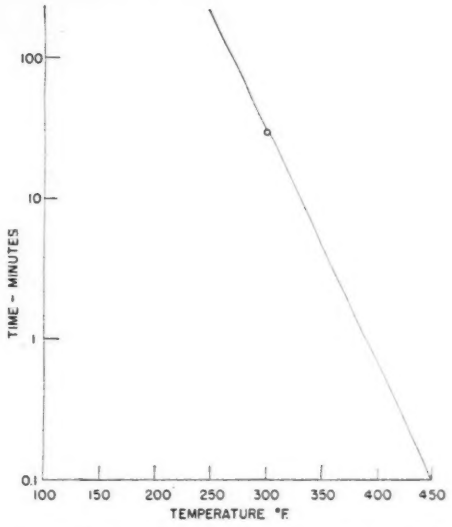

Fig. 1. Time of Vulcanization as a Function of Temperature

the temperature of the rubber compound is increased; i.e., an increase of 18° F. means, in general, that an equivalent cure can be obtained in about half the time.

In a thick piece of rubber the temperature of the center lags far behind that of the surface so that uniform vulcanization is difficult. If the temperature is raised very slowly, the variation of temperature from the surface inward is reduced, but the mold time required to obtain uniform cures in thick sections by such a method becomes prohibitive. Apparently four general plans are being employed:

1. To reduce the time required, the surface is overcured so that less undercure of the interior occurs. Over- and undercure are judged by less than optimum physical properties, especially stress-strain, hysteresis, and combined sulfur data. Through constant improvements in curing techniques by compounders "flat curing" stocks are available which exhibit little change of physical properties over a considerable range of curing time at a given temperature.

2. Step cures are used in which the mold temperature is increased in steps in order to minimize thermal gradients in the rubber.

3. For very thick rubber products, the cure is sometimes brought about on ½- to one-inch thick sections, which are then cemented together, i.e., rubber forming pads.

4. Oven preheating is used to save mold time. Prior to curing, the still unmolded products are placed into an air oven at an intermediate temperature. Care must be exercised to prevent cure from occurring during this preheat period.

Doubtless many other compromises for getting around the poor thermal conductivity of rubber have been employed in the vulcanization process.

The application of heat or the generation of heat within the stock during plastication aids the softening and the flow of the rubber. Similarly heat in milling helps to mix and disperse the pigments. Other chemical processes, such as polymerization, require heat to foster the reaction. Heat-sensitive coagulants and heat-sensitive blow-

[1] B. F. Goodrich Research Center, Brecksville, O.
[2] United States patents Nos. 2,129,203; 2,163,993; 2,188,625; 2,261,847; 2,280,771; 2,303,341.
[3] Nos. 2,089,966; 2,109,843.

ing agents are common in rubber technology. Processes for the reclaiming of the rubber involve heat. The sealing of thermoplastic films requires heat. Drying can be performed much more rapidly if heat is applied.

Usual Sources of Heat

The usual sources of heat in these factory processes are steam, gas, and electricity. In factory curing the temperature rise is often brought about by transferring heat from steam within the metal platens through molds to the surface of the rubber. Most rubber compounds are such poor thermal conductors that the temperature in the interior remains considerably below the maximum surface temperature; hence the resulting degree of cure varies widely in thick sections. Some holdover of internal temperature occurs after the source of heat is removed, but this only is a partial compensation. The thermal insulating properties slow down the heating of a typical 4-inch diameter by 2½-inch thick circular rubber cylinder so that the center is still 20 degrees below the platen temperature even after 90 minutes' heating (see Figure 2). As a result of this lag, cures of large objects require long periods of time to reach a given uniformity of cure.

Radio-Frequency Energy as a Source of Heat

Radio-frequency energy has for a long time been known to produce heat by conductance current in materials which are ordinarily thought to be electrical insulators and which do not heat up under similar voltage gradients at the ordinary power frequency of 60 cycles per second. Radio-frequency heating does not depend on thermal conductivity since the energy is absorbed uniformly throughout the mass.

Definitions. The term "conductor of electricity" is ordinarily applied to metallic conductors of the type used in 60 cps. power work, such as copper and aluminum. Other metals are conductors to a greater or lesser degree. The term "insulator" is generally applied to non-metallic materials which conduct very little 60 cps. current, such as pure gum rubber, porcelain, Bakelite, mica, glass, and dry wood. The word "dielectric" is usually used to refer to an insulator which may be subjected to a voltage field between two electrodes. Many materials which have been classed as insulators from the 60 cps. standpoint will conduct an increasing amount of current as the frequency is increased. At frequencies above 10 million cycles per second even pure gum rubber will conduct sufficient current to become quite hot during a short exposure to an electric field.

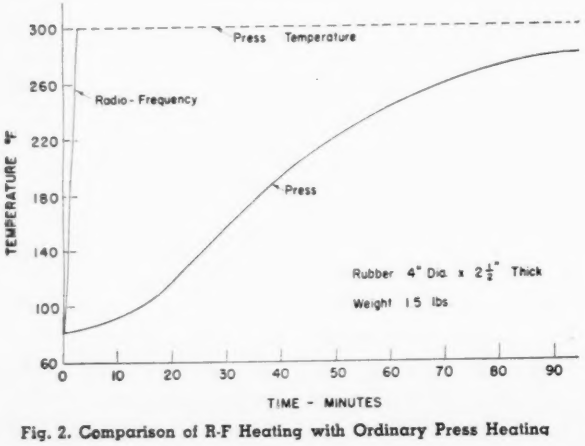

Fig. 2. Comparison of R-F Heating with Ordinary Press Heating

Mechanism of Energy Absorption. The radio-frequency heating of dielectric materials is possible because of electrical energy absorption in friction which retards the oscillation of electrically charged bodies consisting of electrons, ions, and dipoles. Differing from an electron or an ion, the dipole consists of both a positive and a negative charge within the single unit so that it tends toward a rotary oscillation about a fixed axis instead of linear oscillation. Increasing energy loss with frequency is the general tendency of dielectrics and is usually explained by the dipole type of absorption which is not present for d-c after the initial charging current. If we then use low frequency a-c the dipoles are completely oriented for most of each cycle, requiring but a small portion of each cycle for complete alinement. As the frequency is increased and the voltage held constant, the dipole moves a greater part of the time and absorbs more energy. The average force is constant since it depends on a constant dipole moment and a constant field intensity. The energy loss contribution of the electrons and ions can also increase with frequency because they too may have restricted regions of movement. The heating of such a substance will then be as uniform as the distribution of these energy absorbing units and the applied field.

The current which flows in a dielectric in an alternating electric field consists of two components as shown in the vector diagram (Figure 3). The capacitance current, I_C, is that required to displace the charged bodies in the absence of friction and represents no power absorption. The conductance current, I_G, sums up all the absorption losses involved in these motions. I_Z is the resultant impedance current. The electrical energy absorption is given by:

$$(1)\quad W = EI_Z \cos \theta$$

and since $I_G = I_Z \cos \theta$

and $I_G = EG$

then $$(2)\quad E = \sqrt{\frac{W}{G}}$$

where E is the voltage gradient per cm.
W is the power required in watts to heat one cm^3. (at 100% efficiency)
G is the specific conductance in mho-cm^{-1}.

The value for W is based on the rate of temperature rise required:

$$(3)\quad W = 2.32 C_P \varsigma \frac{\Delta T}{t}$$

where C_P = specific heat in calories/gm/°C.
ς = density in gm/cm^3.
ΔT = required change in temperature in °F.
t = time in seconds allowed for the heating.
The constant involves the mechanical equivalent of heat and the relation between C. and F. degrees.

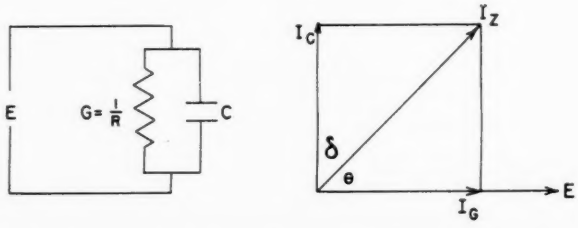

Fig. 3. Schematic and Vector Diagrams for Current Flowing in a Dielectric in an Alternating Electric Field

TABLE 1. VOLTAGE AND CURRENT REQUIRED FOR RADIO-FREQUENCY HEATING*

Stock	Frequency Mc.	G in 10^{-6} mho-cm^{-1}	ε'	P. F. %	Volts per Cm.	Current per Cm^2 in 10^{-6} Amps. Total		
						Conductance	Capacitance	Amps. Total
Smoked Sheet	1	.0047	2.34	.36	14000	65	18000	18000
	10	.028	2.25	.22	5700	150	71000	71000
D1	1	.0662	2.34	.48	12000	75	16000	16000
	3	.017	2.32	.44	7300	124	28000	28000
	10	.062	2.23	.51	3800	240	47000	47000
	30	.17	2.06	.50	2300	390	79000	79000
D2	1	.15	7.14	3.8	2400	360	9500	9500
	3	.32	6.98	2.7	1600	520	19000	19000
	10	.75	6.52	2.1	1100	800	39000	39000
	30	1.9	6.08	1.9	670	1300	68000	68000
D3	1	.068	6.41	1.9	3500	240	12000	12000
	3	.15	6.37	1.4	2300	340	24000	24000
	10	.50	6.04	1.5	1300	640	43000	43000
	30	1.6	5.77	1.7	720	1200	70000	70000
D4	1	.19	3.60	9.3	2170	410	4400	4400
	10	.99	3.20	5.6	950	940	16800	16800
	100	4.93	2.96	3.0	425	2100	70000	70000
D5	10	1.80	3.05	10.6	....	....	....	....
Wood	10	1.60	3.87	7.4	530	850	11000	11000

*Based on a temperature rise of 50° F. per minute. All rubber stocks are uncured and at 80° F. For heating at x° per minute multiply the table values of voltage and current by $\sqrt{x/50}$.
ε' Dielectric constant.

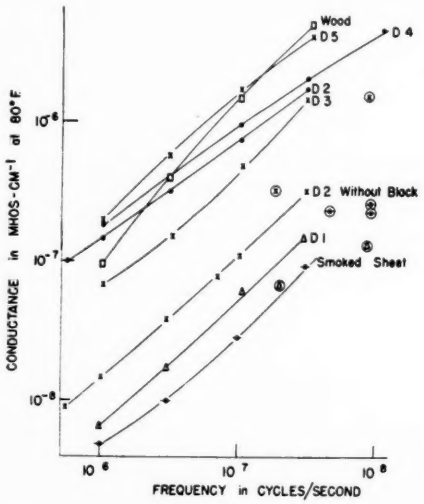

Fig. 4. Relation of 80° F. Conductance and Frequency; Rubber Compounds Are Uncured

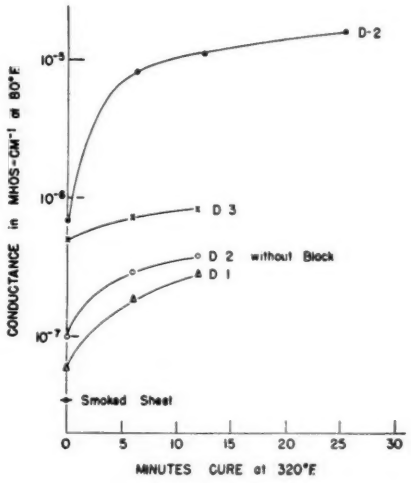

Fig. 5. Conductance Change with Cure (10 Mcps. 80° F.)

For a compound of a given density and specific heat equations (2) and (3) enable the calculation of voltage, and current required for any desired heating rate. The conductance at the frequency under consideration can also be calculated. However, frequently an empirical quantity, the "loss factor", (ε''), is employed to evaluate materials to be used for electrical insulation. Its relation to conductance follows:

$$(4)\quad \tan\delta = \frac{I_G}{I_C}$$

By applying Ohm's law and the definition of capacitive reactance, we obtain

$$(5)\quad G = 2\pi f C \tan\delta$$

By substitution $\tan\delta = \dfrac{\varepsilon''}{\varepsilon'}$ (definition)

and $\varepsilon' = \dfrac{C}{Ca} = \dfrac{C}{.0885 \times 10^{-12}}$

ε' = dielectric constant

Ca = capacitance of one cm. cube of air in farads.

Thus $(6)\quad G = .556 \times 10^{-12}\ f\varepsilon''$

The curves of Figure 4, relating conductance and frequency, fit fairly well an equation of the form:

$$(7)\quad G = Kf^A$$

For these rubber compounds the coefficient K has a value between 8.6×10^{-15} and 5.0×10^{-12}; the exponent A lies between .75 and .98 so that the loss does not increase proportionately with frequency. For a typical wood the value of A is 1.20. The loss factor is proportional to the loss per cycle or G/f.

Combining (6) with (2):

$$(8)\quad W = .556 \times 10^{-12}\ E^2 f\varepsilon''$$

The term "power factor" is also often employed and is defined as:

$$(9)\quad \text{P. F.} = \cos\theta = \sin\delta = \frac{I_G}{I_Z}$$

$$\%\ \text{P. F.} = 100 \cos\theta$$

If δ, the loss angle, is near zero, which is true of most rubber compounds, then:

$$(10)\quad \text{P. F.} \cong \tan\delta$$

In unpigmented rubber or GR-S the conductance is very low and may arise from small amounts of impurities including water vapor which could serve as a medium for ionization of other impurities. The addition of carbon black greatly increases the conductance of rubber, both electronic and ionic. Curing the rubber still further increases the conductance, probably because of the forma-

tion of additional dipoles. The medium is also changed by curing so that ionic losses may be increased.

DIELECTRIC MEASUREMENTS. Since the heating rate is a function of the conductance of the compound, considerable information concerning relative heating rates can be obtained from conductance measurement. These dielectric properties have been measured with bridge-type measuring equipment entirely independent of the power equipment used for radio-frequency heating. For these bridge measurements the temperature of the sample is controlled by means of a thermostatted oven, and radio-frequency currents, too small to result in any noticeable heating of the samples, are employed to determine the dielectric constant and conductance from which the power factor is calculated. The small samples required for this work were less than 1/10-inch thick and three inches in diameter. Tinfoil electrodes were molded on the rubber. The measurements are shown in Figures 4 and 5 and Table 1. Specific heats and densities are given in Table 2. Recipes for all compounds are listed in Table 3.

TABLE 2. SPECIFIC HEAT AND DENSITY OF COMPOUNDS

Compounds	Cp	ζ
Smoked sheet	0.502	0.93
D1	0.47	0.99
D2	0.38	1.16
D3	0.38	1.13
D4	0.37	1.25
Wood (maple)	0.42	0.55

TABLE 3. COMPOUNDS

	Parts by Weight				
Ingredients	D1	D2	D3	D4	D5
Natural rubber	100	100	...	...	...
GR-S	...	...	100	...	...
Sulfur	3	3	2	...	...
Zinc oxide	5	3.25	3.75	...	...
Accelerator	0.6	0.85	1.2	...	...
Softener	...	6	10	...	...
EPC black	...	60	45	...	...
Polyvinyl chloride	...	...	...	100	...
Dioctyl phthalate	...	...	...	52	...
Phenol-formaldehyde preform	...	...	...	...	100

The effects of these basic variables were studied:

1. Frequency (.5 to 30 megacycles per second).
2. State of cure of the rubber compound.
3. Temperature of the rubber compound.
4. Loading with pigments, especially carbon black.
5. Kind of rubber: natural or GR-S.

In addition, phenol-formaldehyde (Bakelite) preforms and wood were studied.

Table 1 shows the calculated voltage per centimeter required for heating several materials at 50° F. per minute at frequencies from one to 30 mcps., a range available in commercial radio-frequency heating equipment. These values are based on the conductance data of Figure 4 and specific heat and density from Table 2. Voltages above 2000 volts per cm. are difficult to obtain for specimens over 5 cm. thick and represent low efficiency because of the high electrode voltages which result in appreciable stray field losses. In the smoked sheet (also uncompounded GR-S) and in D1 (gum natural rubber compound) the low-frequency voltages required are excessive because of the low conductance of these materials. Because of the extremely low power factors, the current required to produce these voltages is 99% capacitive. This represents a circulating current doing no heating in the rubber, but giving rise to losses in the associated conductors and circuits due to their resistance. In general, materials with power factors below 2% are hard to heat. Increases in frequency result in a reduction of the required voltage, but the power factor remains low, so that while faster heating of D1, for example, becomes possible from the standpoint of voltage, the efficiency is still low. The uniformity of heating in this compound is good, however, as would be expected from the small change of conductance with state of cure.

Natural rubber compound D2 with 60 parts of carbon black heats easily since it has a higher conductance (Figure 4), requires lower voltage, and has a high power factor. Hot spots tend to develop, however, because of the rapid increase of conductance and increase of power absorption as the cure progresses (Figure 5). Conductance also increases with temperature independently of the effect of cure in rubber carbon black stocks as will be shown in Part II of this paper. A natural rubber stock compounded similar to GR-S compound D3 with 45 parts of EPC black gave a conductance at 80° F. within 15% of D3 from 10 to 30 mcps. D2 without black gives higher conductance than D1 because of the softener which increases the mobility of the ions. Figure 5 shows that a much greater increase occurs in the conductance of a natural rubber carbon black stock, D2, than in a GR-S carbon black stock, D3, during cure. This increase of conductance is possibly due more to a rearrangement in the carbon black than the effect of cure. Natural rubber without black increases in conductance by a much smaller factor.

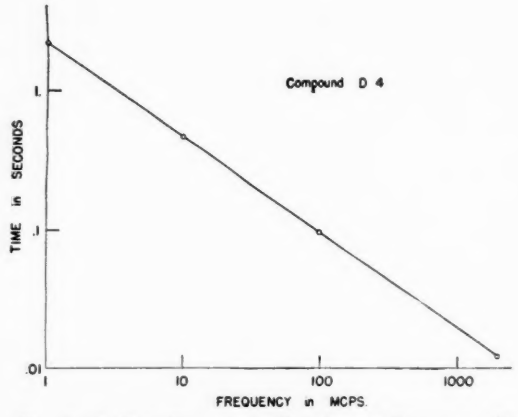

Fig. 6. Sealing Time as a Function of Frequency (50 V./0.001-Inch)

Figure 4 also shows conductance data obtained by a calorimetric method as described in Part II of this paper. The points are denoted by the circled symbols for comparison with the curves. These measurements are more difficult to make and less accurate than those measured with the bridge circuit. In general, the values agree reasonably well, considering the fact that no correction has been made for thermal radiation losses.

Commercial applications of radio-frequency heating which have been most successful are the heating of wood and phenol-formaldehyde. The power factors of these substances are both considerably higher than that of any factory rubber compound; hence, less voltage and current are required at the same frequency. This condition means less tendency toward arcing, lower circuit losses, and greater efficiency.

Radio-frequency sealing of thermoplastic materials can also be aided by means of these dielectric measurements. Data on a thermoplastic stock of 100 parts of polyvinyl chloride and 52 dioctyl phthalate has been included to show what can be expected in a typical case. Calculations based on these data are plotted in Figure 6. The time required for the stock to reach sealing temperature is plotted against frequency at a constant voltage of 50 V./0.001-inch. The primary limitation on the sealing rate is the breakdown voltage which probably does not

change very much with frequency in this range. Breakdown voltage data which we have for the material at 60 cps is around 500 V/0.001-inch for thin sections. At 200 mcps a continuous roller-type machine has produced seals at the rate of 42 feet per minute.

Radio-Frequency Heating in the Curing Mold

A material suitable for use in the construction of a radio-frequency mold must have the following qualifications: (1) suitable radio-frequency dielectric properties; (2) operable at temperatures of 350 to 400° F. for long periods of time; (3) strong in compression and impact; (4) dimensionally stable; (5) good thermal insulator; (6) machinable or moldable to a smooth finish; (7) low cost.

Table 4. Mold Materials

Material	Maximum Temp. °F.	Dielectric Constant	Power Factor	Tensile Strength psi.	Compressive Strength psi.	Impact Resistance	Arc Resistance Sec.	Approximate Cost Per In.³
Silicone-glass laminate	480	3 to 4 at 1 mc	.0015 to .0015	12000—16800 Lengthwise	33000 F 9000 E	14	260 to 360	$0.52
"Teflon"—tetrafluoroethylene	570	2.0 60 to 10^3 cps	<.0002	2000 to 4500	1700	4	> 100	1.10
Kel-F.—Polymonochlorotrifluoroethylene	400	2.72 at 1×10^2 cps 2.29 at 2.5×10^{10} cps	.022 at 1×10^2 cps .0055 at 2.5×10^{10} cps	9400	.....	.....	.....	.....
Melamine resin-glass fabric laminate	390	7.0 at 10^6 cps	.015	25000	55000 F 22000 E	12	185	0.20
Melamine resin-cotton fabric laminate	300	7.4 at 10^6 cps	.044	20000	44000 F	1.12	175	0.07
Mycalex	700	7.4 at 10^6 cps	.0018	Lengthwise 6000	35000	1.68	300	0.07
Glass bonded mica								
Steatite	> 400	6.3 at 10^6 cps	.00065	9000	80000	Brittle	...	0.04
Porcelain	350	5.6	.008	4000	50000	Brittle	...	
Textolite 1421	175	2.4 at 3×10^8 cps	.0006 to .0009	11000	....	.44	...	0.55
Polystyrene	150	2.5	.0001 to .0004		15000	.30–.40	130	0.01
Polyethylene	220	2.3	.0005	1900	....	..	...	0.015
Glass—96% silica	1650	3.8 at 10^8 cps	.0005	....	....	..	...	0.01
Steel	> 1000	....	....	30000	....	Excellent	...	0.04

Note: Impact resistance—Izod Impact—Foot-pound inch notch width.
Dielectric constant and power factor are at 25° C.
F—flatwise.
E—Edgewise.

Numerous materials have been studied. A large number of materials is immediately eliminated by the insulation and temperature requirements. One of the most promising materials appears to be a silicone-glass fabric laminate. This is good radio-frequency insulation and is said to withstand continued exposure to temperatures as high as 480° F. The material can be machined, using carboloy tipped tools. The finish can be made fairly smooth by grinding the surface. Impact resistance is fairly good. Tensile strength, compressive strength, arc resistance, and dimensional stability are all good, as may be seen from Table 4, which was compiled from manufacturers' literature.

A less expensive material was found to be a melamine resin-glass fabric laminate. This laminate has properties similar to that of the silicone laminate with the exception of a temperature limitation of 390° F. and a higher compressive strength.

Ceramic materials such as steatite and porcelain are not machinable and are so brittle that they are almost unsuitable as a mold material. There are some special cases where a cast ceramic mold may be used. These materials can withstand very high temperatures, but the radio-frequency loss increases very rapidly with both temperature and frequency.

"Teflon" is a very unusual material and deserves special mention here. The material is tough and leathery with a waxy surface. It has a very low radio-frequency loss for frequencies up to 3000 mcps. "Teflon" has excellent high-temperature properties, being stable to about 600° F. This material machines well, but it has a low modulus and tends to cold flow. It can be used to construct small molds with heavy wall thickness or large molds if used in conjunction with some rigid backing. Since materials will not readily adhere to "Teflon," it makes a good cover for electrodes and the like.

Uniform Shaped Samples Cured Entirely with Radio-Frequency Heat. Uniform shaped rubber samples enclosed in an insulated mold were heated in order to obtain data on complete radio-frequency cures. A steatite mold consisting of a right cylinder three-inch I.D. and 3½ inches high was used. The top and the bottom of the mold consisted of metal plungers which also served as electrodes. Pressure was applied to the sample to prevent blowing and maintain the electrodes parallel during the radio-frequency heating period.

A very interesting sample was obtained. The entire sample was cured with the exception of a ¼-inch skin around the outside. The outside of the sample never reached curing temperature owing to the conduction and radiation losses to the mold and electrodes.

To obtain maximum heating rates, some very small rubber samples, 1¼-inch diameter by ¼-inch thickness, were heated in a cavity mold cut from a sheet of Textolite #1421. The sample was placed into the cavity, and the pressure applied by the electrodes which were four by four inches square; hence the sample was only a small part of the area of the condenser; the remainder was the Textolite plate. One 14-gram sample of natural rubber tread stock was cured in seven seconds. This curing required a heating rate of about 3600° F. per minute. This high heating rate did not occur consistently, and many samples arced-over with much lower voltage.

Several other satisfactory molds were made to study various properties of rubber. A four- by four- by one-inch cavity mold was made of silicone-glass laminate. A round cavity mold three inches I.D. and one-inch thick was made of the same material.

Figures 7 and 8 show a mold utilizing both radio-frequency and 60 cps. resistance heating. Two aluminum platen electrodes are separated by melamine formaldehyde-glass laminate. The radiation and conduction losses are supplied by the 60 cps. heaters. Radio-frequency energy is only used to bring the interior of the rubber rapidly to the curing temperature. Figure 9 shows a solid rubber tire cured in this mold.

Summary and Conclusions

It has been shown how dielectric measurements have been utilized to select voltages and frequencies for heat-

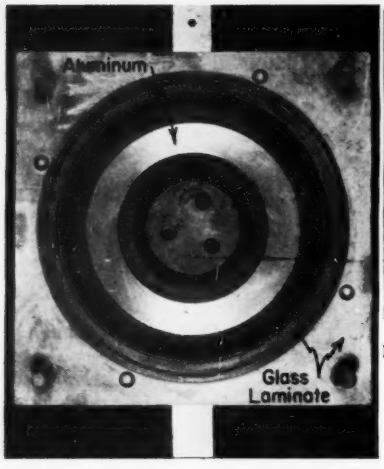

Fig. 7. Mold Utilizing Both R-F and 60 Cps. Resistance Heating. Aluminum Platen Electrodes Separated by Melamine Formaldehyde Glass Laminate

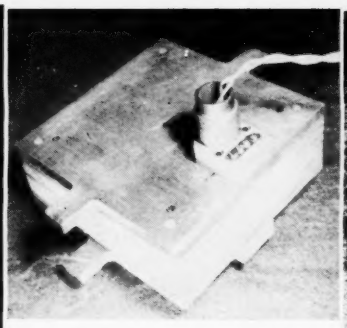

Fig. 8. View of Mold in Figure 7 after Closing

Fig. 9. Solid Rubber Tire Cured in Figure 7 Mold

ing rubber-like materials. Many interesting differences occur in the conductance of these stocks. Compounds containing 45 to 60 parts of an EPC carbon black have about ten times the conductance of pure gum rubber in the frequency range from one to 30 mcps. Curing of rubber stocks increases their conductance. The presence of carbon black enhances the increase of conductance with temperature, but this is not necessarily associated with the cure. Plasticized polyvinyl chloride, phenol-formaldehyde, and wood exhibit higher conductances than any conventional rubber compound.

It is possible to construct molds having suitable insulation for radio-frequency curing. Many dielectric materials are available having a wide range of physical properties. Small solid tires have been cured with combined radio-frequency and 60 cps. heating.

Report on the Rubber Industry in Ceylon

Ceylon has signed an agreement with the United Kingdom whereby double taxation on income and profits will be avoided. By this arrangement concerns, including rubber companies, operating in Ceylon will find their taxes cut by about 12%, and the Government of Ceylon expects that the lower rates will spur United Kingdom investments here.

About a week earlier the Minister of Finance had announced an export duty of 15 rupee cents per pound of rubber, effective immediately. Hitherto no tax, except a small cess, had been levied on rubber. The Minister explained, however, the rubber industry is one of those which has benefited most as a direct consequence of devaluation. Since May of this year the price level had consistently been over 115 rupee cents a pound and had even been as high as 150 rupee cents a pound. Furthermore rubber had been subsidized for a considerable period up to a few years ago. Under the circumstance a tax of 15 rupee cents was not considered onerous, the less as rubber producers had been telling the government—prior to the increase in rubber prices—that if prices could be stabilized at 70 rupee cents a pound, they would be in a position to replant their estates with budded rubber. At the prices mentioned, the tax would leave the producers a safe margin.

While shippers were still trying to move the Minister from his stand that the levy should be imposed also on rubber bought before the introduction of the tax, but still awaiting shipment, the price of rubber zoomed to the highest levels in 25 years. This sudden rise has been ascribed locally to competitive buying by America and Russia. It is also hinted that American tire manufacturers are piling up supplies of rubber in anticipation of any government control of imports the political situation might bring on.

Ceylon's area under rubber at December 31, 1949, was 629,405 acres, of which about 460,000 acres were planted before 1922, a report by the Rubber Controller reveals. Only 34,821 acres of the total have been budded. At present 58% of the rubber area is owned by Ceylonese.

Total production of dry rubber in 1949 was 89,500 tons; exports were 90,489 tons and included 879 tons of latex; local manufacturers and retreaders used 139 tons of rubber. In 1949 permission was obtained to replant 2,197 acres; the total area replanted in the period June, 1934, to December 31, 1949, was 37,700 acres.

In connection with the present price trend, it may be noted that the average price of No. 1 sheet in 1949 was 56.18 rupee cents a pound, which was only possible because devaluation sent prices up in the latter part of the year.

Outputs in the first half of 1950 came to about 48,000 tons, 7,000 tons above the 1949 figure for the same period. On the basis of experience in the preceding five years, when production in the first half of the year was found to represent between 41.1 and 45.8% of the total for the year, it is expected that 1950 production may well exceed the record of 105,500 tons in 1943.

Exports for the first half of 1950 totaled 54,497 tons and included 556 tons of latex and 5,103 tons of sole crepe. Almost half the exports went to the United States. Ceylon itself used 77 tons, against 62 tons in the corresponding period of 1949. Stocks of rubber, which had been 19,324 tons on January 1, 1950, came to 12,750 tons at the end of June.

In Ceylon the improvement in the price of rubber following devaluation, together with the prospect of heavier purchases of natural rubber by the United States, has resulted in a movement of estates to recall labor which had been discharged last year when the low prices prevailing at the time made tapping uneconomical for many producers. It is reported that about 30 estates have already reengaged workers, and several others were expected to do so shortly. Official statistics show that nearly 5,000 laborers employed on rubber estates were thrown out of work last year as a result of retrenchment measures.

Ceylon is to introduce legislation to improve the packing and shipping of rubber, following the example of the Malayan Rubber and Packing Ordinance of 1950.

Experiments by the Medical Research Institute of Ceylon have shown that locally extracted rubber seed oil is effective against house flies, lice, and other insect pests, it is reported.

Rubber estates are to be exempted from the provisions of the Foods Production Ordinance whereby estate proprietors are obliged to cultivate a certain amount of food crops or pay the government a specified sum of money. However rubber estates having suitable land for the purpose may be called upon to grow paddy; furthermore, such land may not be planted to rubber. The exemption of rubber estates from compulsory food production was strongly urged in the report submitted by the Rubber Commission in 1947.

EDITORIALS

Let's "Look at the Record" on This New Government Rubber Program

SENATOR LYNDON B. JOHNSON, Democrat of Texas, chairman of the Committee on Armed Services Preparedness subcommittee formed on July 17, and former chairman of the Armed Services subcommittee on rubber primarily responsible for the Rubber Act of 1950, brought out on September 5 his first report on surplus property and rubber. In this report the Senator takes the position that "Government agencies and segments of the rubber industry have been slow to appreciate that the peril to our natural rubber supply lines requires that all possible steps be taken now to make more natural rubber available to the strategic stockpile.

"Because of the 'business as usual' attitude on rubber, the subcommittee has found it necessary to take vigorous steps directed primarily at making more natural rubber available to the stockpile," it is said, and the report then goes on to list the steps taken and the recommendations made, practically all of the latter now having been supported by White House directives.

Senator Johnson and his subcommittee deserve much credit for awakening the Administration and its agencies responsible for national security in rubber out of their lethargy, which persisted even after the outbreak of the war in Korea, *but* the Senator and his subcommittee *do not deserve all the credit* that they seem to be seeking for the now seemingly assured preparedness in rubber that will be so important if the United States should become involved in a global war in the next few months. As the Senator knows from his close association with national rubber problems since 1947, the rubber industry has been constantly reviewing and recommending both to Congress and the Administration since the end of the last war many of the same steps that he has now so vigorously urged. If these industry recommendations had been acted upon a year or two ago, there might not have been the almost frantic activity in rubber in Washington during the last two or three months.

Let's look at the record! As long ago as November, 1947, following a series of meetings with officials of the Munitions Board and other government agencies, the manufacturing members of the Munitions Board's rubber industry advisory committee began the first series of "Blue Book" studies to establish military and essential civilian requirements in rubber to cover a five-year emergency, develop security stockpile requirements on a firm statistical basis, and work out estimates on world production of natural rubber and on natural and synthetic rubber requirements as a yardstick in developing new security and synthetic rubber policies.

On December 1, 1947, the rubber manufacturing industry recommended to the House Armed Services rubber subcommittee of the 80th Congress that accumulation of the strategic stockpile of natural rubber was of paramount importance, that in order to acquire the natural rubber stockpile in the shortest practicable time it would be necessary to continue the use of synthetic rubber at the then existing levels [just under 40,000 tons a month —EDITOR], and a program of stockpiling GR-S to give an additional measure of security.

Following recommendations made by the industry committee and individual companies on similar subjects to the House Armed Services and Senate Banking & Currency committees, in January, February, and March, 1948, in connection with the formulation of the Rubber Act of 1948, on October 27, 1948, The Rubber Manufacturers Association, Inc., submitted to the Munitions Board a three-page document entitled, "The U. S. A. Rubber Outlook—1949-1953," recommending a program covering preparations for a possible emergency. Points covered included accumulation of a natural rubber stockpile, accumulation of emergency stocks of GR-S to conserve natural rubber in the first year of an emergency, and the continuation of GR-S production at 34,000 tons a month at least until stockpile objectives were attained. [Production of GR-S dropped below 20,000 tons a month in January, 1950.]

Space does not permit detailing many other similar recommendations made by the rubber industry to Congress and the Administration during 1948 and 1949, but in early 1950 this same energy was displayed by the industry in connection with the formulation of the Rubber Act of 1950.

On July 6, 1950, after the outbreak of the Korean war, the rubber industry, *before* the formation of the Preparedness subcommittee, recommended immediate increase of GR-S production, plans to produce GR-S at the rate of 600,000 tons a year by January, 1951, accumulation of a strategic inventory of GR-S, and reactivation of all standby Butyl rubber capacity.

On August 24, 1950, *again before* the Preparedness subcommittee's report of September 5, the industry recommended to W. Stuart Symington, chairman of the Natural Security Resources Board, reactivation of all GR-S copolymer plants, provision for all butadiene needed to operate all copolymer plants at capacity, expansion of GR-S output to 720,000 tons a year, increasing capacity of "cold rubber" GR-S to 50% of total dry GR-S capacity, and expansion of GR-S latex capacity to 50,000 tons a year with 50% of this capacity in "cold rubber" latex.

During August the industry developed and presented the basis of the limitation order of the Commerce Department of August 25, in advance of any post-Korea action by Congress or the Administration to speed up natural rubber stockpiling.

Let's give credit where credit is due, Senator! Acknowledgment of the fact that the industry has been diligent in its efforts to preserve national security in rubber is in order. Congress does not produce rubber or rubber products, but has much to gain from friendly cooperation with those who do.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Double-Screw Mixer[1]

L. F. Street[2]

THE Compounder-Extruder (see Figure 1) made by Welding Engineers is designed for such operations as the continuous dispersion of color into polystyrene; the compounding and extrusion of vinyls from powder blends; the compounding and extrusion of cellulosics; and the compounding and mixing of various plastics materials, such as nylon, saran, acrylics, and polyethylene.

History and Development

The machine is equipped with two worms lying side by side and having parallel axes. This design grew naturally out of extrusion work that had been conducted previously by the company.

Since the middle Thirties, work was carried on in the development of extrusion equipment of the multiple worm design for various applications. Machines for handling chicle, clay, and catalyst materials were built with anywhere from two to six worms. The largest of these machines had two 14-inch-diameter worms and was equipped with a 500-h.p. motor drive. The capacity of this machine was from 30-50 tons of clay a day at moderate die pressures. Several machines were also built for the manufacture of catalyst pellets in large quantities for use in the refining of aviation gasoline.

Plans to get into the plastics extrusion and processing field were brought to a head when an opportunity arose to develop such equipment for the military defense program. Work starting at that time and continuing over a period of years has brought the Compounder-Extruder to its present advanced state of development.

[1] Presented before sixth annual National Technical Conference, Society of Plastics Engineers, Inc., Cleveland, O., Jan. 13, 1950.
[2] Welding Engineers, Inc., Norristown, Pa.

Design of Machine

The equipment is designed to have two worms lying side by side in the area of the hopper which is normally made in the form of a round, vertical opening over the worms (see Figure 2). Having the two worms in this fashion permits a rather large-diameter hopper for the size of machine involved. For example, the Model 2041 Compounder-Extruder, which has two two-inch-diameter screws, has a hopper pipe with a 3½-inch diameter. Of course hopper extensions or bins of any desired size can be fastened above this opening. On a larger machine having two six-inch-diameter screws, the hopper opening is a 10-inch-diameter pipe.

This large hopper opening permits the material to lie freely on the two worms with a minimum tendency toward bridging. The action of the two worms side by side is such that each acts as a stuffer or forced feeder for the other, helping to fill the flights of the adjacent worm with material. This action promotes the flow of material from the hopper and gives a high and uniform rate of extrusion.

As the material moves forward from the hopper, it is brought under pressure by the action of the worms and is plasticized by the heat from the liners and the mechanical heat generated by the worms. The plasticizing, compounding, and mixing of material take place in the back portion of the machine, which comprises approximately half the total length of the cylinder.

The worms are designed to knead and work the material and prevent it from escaping the compounding section until heated up to a plastic condition. As the plastic material escapes the compounding section, it enters an area where the top portion of the cylinder has been removed, and the material is exposed to the atmosphere when desired. The material is conveyed through this open section and then seized by the ejecting worms which move it forward to the die and extrude it out in the desired shape. The front or ejecting worms also continue the mixing and kneading of the material in much the same manner as a conventional extruder accepting hot feed.

The Compounder-Extruder is usually equipped with worms stellited on their peripheries and with hard surfaced cylinder liners. The clearance between the worms and cylinder is usually 0.010-inch on the diameter of a two-inch screw.

The machines are being made at present in two series, each in a range of sizes. Machines in the "40" series, such as Model 2041, pass the material from the compounding section directly into the ejecting worms, and a short length at the rear end of the ejecting worms is opened to the atmosphere. This machine has a cylinder with an overall length of 34½ inches.

Machines in the "50" series, such as Model 2052, have an additional length of worm and cylinder inserted between the compounding and the ejecting zones which gives further kneading and mixing action on the material without generating high pressure. The cylinder length of this model is 50 inches when the screw diameter is two inches.

Material passing through this latter type of machine is first plasticized and mixed, then goes into the forwarding area on to what we term mill worms. Here it is kneaded and worked, as it is conveyed forward, and is then passed to the ejecting worms where it is extruded. Machines equipped with mill worms customarily have the entire length of barrel in that section open at the top. In addition to the mixing action that takes place in the mill worm zone, the working out of air and the flashing off of moisture and other volatiles can take place either by passing directly into

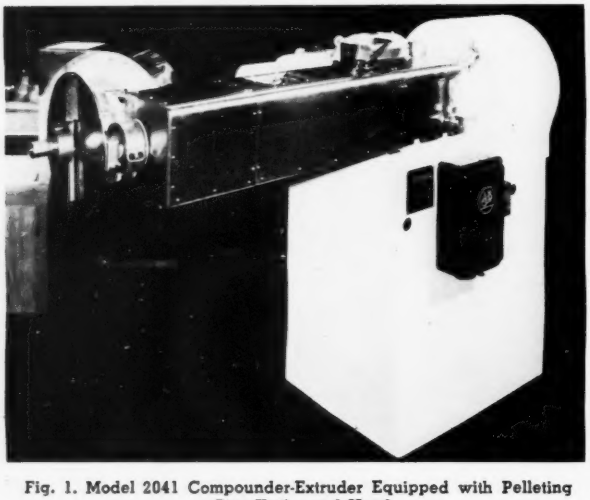

Fig. 1. Model 2041 Compounder-Extruder Equipped with Pelleting Die, Knife, and Hood

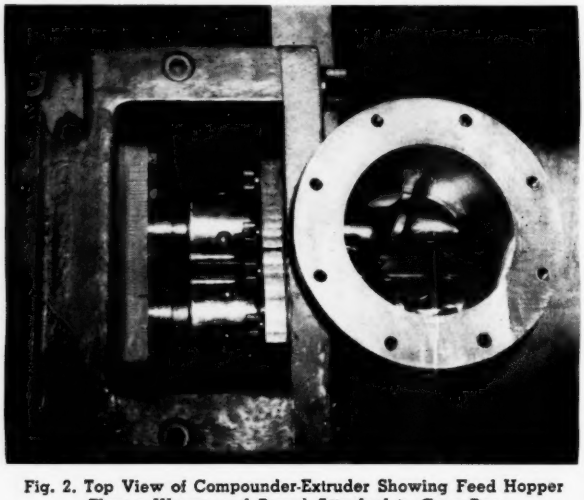

Fig. 2. Top View of Compounder-Extruder Showing Feed Hopper Flange Worms and Barrel Attached to Gear Box

the atmosphere or by being drawn off under reduced pressure. Pressures as low as 1½ millimeter of mercury seem to be quite feasible in the operation of this equipment, and it is also possible to use an inert gas in this reduced pressure area, if desired.

The Compounder-Extruders are usually jacketed for heating by circulation of hot oil. Several zones are provided in order that the temperatures of the hopper, compounding section, mill section, and extrusion section may be controlled independently of each other. By this method operations have been carried out with jacket temperatures over 600° F. Work done to date indicates that no more than two temperatures are required for most operations, and that many operations can be performed satisfactorily with the entire machine at one temperature. Dies and crossheads are electrically heated and designed for very close and continuous temperature control.

Frictional Heat

The question of frictional heat is important to all manufacturers and users of extruders. First of all, I believe that it is entirely incorrect to classify frictional heat as "undesirable." If there were no frictional heat in an extruder, there would be no extrusion operation. Without frictional heat the extruder screw would be acting merely as a conveyer and would do nothing to mix and homogenize the ingredients into a uniform plastic mass. The mechanical operation of the extruder would do nothing to add heat to the compound in bringing it up to the extrusion temperature. The entire heat generated in the compound would have to be absorbed through the surface of the liners and, if desired, through a heated screw, giving considerable variation in the temperature of the material in different portions of the worm flight, depending on a given particle's distance from the heating surface.

This is not to say that the opposite is true; that all frictional heat is desirable. It would be possible to have frictional heat generated in such a manner that there would be a great deal of heat on a portion of the material going through the machine, and little or no heat on another portion of the material. The optimum condition is to approach as nearly as possible a condition where the extruder screw generates heat in the material in addition to heat derived from the liner; this heat is generated uniformly throughout the entire mass of material; and the material is mixed uniformly during the procedure.

Such a system insures uniform temperature throughout the extruded mass and uniform dispersion of colors, plasticizers, and other ingredients in compounding. Improperly generated and uncontrolled frictional heat is undesirable, just as is any other uncontrolled or improper factor, but a certain amount of frictional heat of the proper type is necessary as a basic factor in the extrusion process.

Coloring of Polystyrene

Coloring of polystyrene has been carried out in machines of both the 2041 and 2052 type. The feed is prepared by mixing the clear polystyrene granules with the desired pigment in any of several simple ways. One method uses a paddle or ribbon mixer or a double-cone blender; while another consists of giving the material a very quick rough premix and then passing it for two cycles through a high-speed mixer such as the Entoleter.

Representative colors that have been worked with are 0.025% Monastral Blue with clear polystyrene, and 0.5% titanium dioxide plus 0.15% alkali blue also with clear polystyrene. A translucent ivory formulation was made with 0.1% titanium dioxide, 0.0075% cadmium yellow, and 0.001% cadmium maroon. A transparent red formulation containing six parts of color per million was made with 0.0005% Plasticol Violet 2R and 0.0001% Plasticol Rubine Red 3B. This latter was mixed in a paddle mixer for about 10 minutes and was produced in uniformly colored pellets.

Work has also been done with larger amounts of coloring agents, such as 3% chrome yellow plus 3% titanium dioxide with clear polystyrene, and 10% titanium dioxide. The quality of pigment dispersion is very good, when the pigment has been properly processed, and the finished product is smooth and uniform in color. In most cases small agglomerates of pigment do not show up even at 27 or 54 magnifications.

Quite a variety of resins has been used from high to low temperatures and from fine granules and beads to coarse granules containing particles measuring ¼- by ½-inch. No difficulty has been experienced under any of these conditions except in the use of the large granules. With the Model 2041 there is sometimes a tendency for tiny clear specks (the remaining kernels of the original uncolored granules) to come through into the product. With the Model 2052 this difficulty is not experienced.

For coloring work the Compounder-Extruder can be fed full at the hopper, or hopper extensions put on of any desired size. The worm speed is usually from 95-110 r.p.m., although slower speeds can sometimes be used. Higher speeds are being investigated and may prove even more satisfactory. To run at 110 r.p.m., a Model 2041 machine should be equipped with a 10 h.p. motor, which will probably draw 7-8 h.p. Under these conditions the output capacity of the 2041 machine has been found to be about 115-125 pounds an hour. Two jacket temperatures of 370 and 400° F. are usually employed. On a small machine a heater of three-kilowatt capacity would be ample for the operation although use of larger heaters would probably be desirable to reduce heating-up time with a cold machine. The product temperature is usually 370-385° F. for such work.

The same type of operation conducted on a model 2052 machine gives the advantages of better pigment dispersion and better mixing to eliminate mottling, and this machine is, therefore, better suited to difficult dispersion jobs. The rate of production is also higher, running at 140-145 pounds an hour. Processing time for the material to go through the machine is one minute, and analysis of the dispersion indicates that the working is equal to 12 minutes on a mill. The machines in this "50" series are made in five standard sizes from two to six inches in diameter, with each machine having about double the capacity of the next smaller size.

Another advantage of the Compounder-Extruder for coloring work is the reduction in clean-out time. In flushing out a Model 2041 with clear polystyrene, most colors can be cleaned out in 10-15 minutes, and even a very intense oil dye was cleaned out to a scarcely visible trace of color in 30 minutes. The Model 2052 can be cleaned out in about 25% less time than the Model 2041.

Polystyrene Processing

In the processing of polystyrene with the Compounder-Extruder it has been found that considerable latitude exists in the jacket operating temperature and material temperature. In one field application of the Model 2041, the machine was operated with a single jacket temperature of about 200° C. After inspection and analysis of the results obtained, a single jacket temperature of 150° C. was used and gave a higher production rate.

In another case a machine of the next larger size, Model 2841, was found to give very satisfactory results with polystyrene at a jacket temperature of 140° C. Under these conditions somewhat more power was demanded from the drive motor, but the oil heaters were not required at all. The heat being generated in the material by the worms was dissipated into the oil jacket and then into the atmosphere. The temperature of the oil leaving the machine was about 12° F. higher than that entering the machine. The temperature of the material was 185° F., somewhat on the cool side for the material.

Work has been done on the compounding and extruding of polystyrene into preforms for compression molding. The feed material has been of varying types, from almost entirely compounded material to raw ingredients, and in each case the machine plasticized, dispersed, and compounded the ingredients into a satisfactory homogeneous mass, and extruded the material in a uniform ribbon that was suitable for cutting automatically into the desired biscuits. On a small machine the production rate for this operation was 100-140 pounds an hour for most formulations. In some cases much higher production rates were obtained, and one very rapid fluxing material extruded on a two-inch machine at a rate of 289 pounds an hour. Polystyrene scrap of all types can be processed on the Compounder-Extruder, formed into pellets, and recolored, if desired.

Processing Vinyls

Quite a variety of compounding and extruding operations on vinyl materials has been performed with the machines. The Model 2041 is satisfactory for many elastomeric vinyls. A formulation that had been very quickly and lightly kneaded in advance was processed through the machine into pellets suitable for final forming. The Model 2052 is also satisfactory for such operation.

A major application for the machines in this field is the compounding of feed material for wire coating. Optimum benefits will be obtained when the material is extruded directly on to the wire after being compounded in the machine. Preliminary experimental work has been done on such an operation using a vinyl powder blend feed, but further work will be needed to determine the exact conditions needed for continuous operation.

In this powder blend work, production rates of 80-100 pounds an hour and even higher have been obtained with a Model 2041 having two-inch-diameter screws. In several of the runs made the gage of the No. 14 building wire being coated was held to 0.003-0.004-inch total variation. In general, the quality of compounding was suitable for a commercial product. Tensile strength tests showed superior properties, and surface finish was very good. Present indications are that a minimum of additional work will result in a fully commercial operation.

The compounding of vinyl powder blends has also been done with a Model 3543 which has screws 3½ inches in diameter. A wet powder blend was satisfactorily compounded at a rate of about 400 pounds an hour despite the fact that the formulation used does not have a high production rate.

Experience to date indicates that there is no definite preference between wet and

preheated or dry powder blends in feeding this equipment. Certain formulations seem to compound better when the material is preheated; while others do equally well when feeding the wet powder. The important factors appear to be the type of formulation (including plasticizers and lubricants) and the degree of dispersion of the powdered ingredients.

Numerous vinyl finished products have been reprocessed through the machine for scrap reclamation purposes. Such products as tubing, strips, and shapes have been chopped up into granules or even irregularly shaped chunks and fed directly into the hopper, plasticized, and formed into pellets. The resultant product was then ready for refinishing.

Many operations have been carried out with vinyl record preforms, both filled and unfilled. The low molecular weight vinyl resins extrude at the rate of 70-90 pounds an hour unfilled, and at the rate of 80-110 pounds an hour when filled, using a Model 2041 machine. The premixing operation for record material is very simple; the ingredients are given a rough premix and then passed through an intensive mixer to break up the agglomerates.

Other rigid vinyl formulations containing the higher molecular weight resins have also been processed without overworking or burning the material. The feed material must be well premixed, and the production rate is somewhat lower than for most other vinyls. Materials of this type can be compounded and either formed into pellets or extruded into a finished article.

Some vinylidenes have also been processed in the machines and show considerable promise. Various formulations have been run without breakdown or burning of the material. A successful operation was the reprocessing of scrap monofilament fed into the machine hopper in hanks. The machine plasticized the filament and extruded it into small pellets suitable for reclamation. Chopped-up filament has also been tried with good results.

Processing of Cellulosics

In the processing of cellulosic resins with the Compounder-Extruder, both flake and plasticizer are thoroughly compounded, and normally absorbed water is removed without the need of special equipment. In one continuous operation, compounded ethyl cellulose granules which had been standing in an open container for three or four months were fed to a Model 2041 machine and extruded into a thin film. No predrying or other treatment was given the granules before feeding into the machine. The moisture in the material passed off into the atmosphere in the open section of the barrel, and the product showed no evidence of moisture or incomplete working. Films ranging in thickness from 0.0025-0.010-inch were produced at a rate of from 25-30 pounds an hour. Output was deliberately retarded because the available finishing equipment could not handle a more rapid flow.

Various compounding jobs have been carried out on ethyl cellulose, cellulose acetate, and cellulose acetate butyrate. Flake, plasticizer, and pigment blends have been fed to the machine, compounded, and formed into pellets. The production rate and quality of compounding varied with the formulations used; production ranged from 20-90 pounds an hour; while quality was generally good.

In recent tests of cellulosics with a Model 2052 machine, a blend was fed to the machine, compounded, and extruded into film having a gage uniformity of 2%. Rate of output was about 90 pounds an hour, and the product was satisfactory in quality. Similar operations have been conducted with the 3½-inch-diameter screw machine which gave an output of about 300 pounds an hour. In the larger machine it was found that a compounder without an additional extraction zone did not completely remove the moisture from some of the materials tested. A Model 3552 having such a special extraction zone does not show this difficulty. Runs made with a Model 2052 using vacuum over the extraction worms also showed excellent moisture removal.

A color dispersion job can also be combined with this moisture removal operation, depending on the physical ability of the machine to premix the colors. The ability to remove a large percentage of moisture from a cellulosic depends on the type of resin. A resin which remains rigid up to 212° F. would be difficult to treat in this manner, since the contained water would absorb heat and tend to hold the resin at a temperature below 212° F., thus keeping the resin rigid and unextrudable.

Processing of Other Plastics

ACRYLICS. Acrylics have been handled successfully on a Model 2041 machine, with color dispersion and clean-out-time approximating those of polystyrene. The rate of production on the two-inch screw diameter machine was 125 pounds an hour and up.

POLYETHYLENE. Polyethylene has been processed on these machines for color dispersion, straight extrusion, and reclaiming of scrap materials. The action of the worms at the hopper will draw polyethylene film into the machine, making it easy to keep the unit running at full capacity. On larger machines with bigger hopper pipes it may be possible to feed the film automatically.

NYLON. Some nylon compounds have been tried in the Compounder-Extruder; the most interesting is the compounding of Type 6 nylon with plasticizer. The material was satisfactorily compounded and pelleted into a product suitable for further processing.

FLUOROETHYLENE. Fluoroethylene resins have been processed in the machine, with the material being converted from a powder to pellets at rates up to 50 pounds an hour. Little work has been done with this material to date, but indications are that applications can be worked out quite readily.

SPECIAL FORMULATIONS. A wide variety of special formulations in acetate and vinyl has been tried, and materials that were almost or totally impossible to plasticize by conventional means have often been processed by the Compounder-Extruder.

Summary and Conclusions

The great variety of operations that have been performed successfully with the Compounder-Extruder has shown it to be a machine capable of great flexibility in application to plastics processing and one which will have much to offer the industry in the compounding and extrusion of its materials.

SPE Sections Start New Season's Meetings

THE Newark Section, Society of Plastics Engineers, Inc., held its first dinner-meeting of the new season on September 13 at the Military Park Hotel, Newark, N. J. Despite inclement weather, approximately 100 members and guests attended the meeting, which was presided over by Section President R. B. Akin, E. I. du Pont de Nemours & Co., Inc. Two technical talks were given: Sanford E. Glick, Monsanto Chemical Co., spoke on "Dry Coloring of Styrene Molding Powder"; and John A. Koons, Process Mold Co., discussed "Beryllium Copper Mold Cavities."

Mr. Glick's talk was similar to one previously given before the New York Section.[1] Since that time the dry coloring process has shown increasing adoption and is now being used for a wide variety of consumer products. The talk was illustrated by many slides showing the dry coloring process, molding of dry colored materials, and typical applications.

Mr. Koons' talk was built around numerous samples of beryllium copper high-pressure cavities and molded products which were passed around and described in detail. These cavities and products were typical of those that cannot be economically made with steel molds because of intricate engraving or machining, undercuts, etc. The speaker emphasized that the master hob needed to fabricate the cavities should be made of heat treated steel having a high drawing temperature in order to withstand the high casting temperatures used with beryllium copper. The talk closed with a discussion of the heat treatment of beryllium copper cavities and castings, and methods of machining, polishing, plating, and welding the alloy.

[1] See our April, 1950, issue, p. 65.

Purchasing Agents and Plastics

The Rochester Section held its first fall dinner-meeting on September 18 at Towne Tavern, Rochester, N. Y. Some 35 members and guests heard talks on "What Purchasing Agents Look for in Satisfactory Plastics Suppliers" by David Rogers, Stromberg-Carlson Co., and Peter Wight, Bausch & Lomb Optical Co.

Mr. Rogers discussed in detail the problems of a purchasing agent from the viewpoint of proper design and application of plastics. He praised plastics in regard to cost and availability, but deplored the fact that the terminology and technology of plastics was such that the layman has no conception of the suitability of plastics for most purposes. Mr. Wight also praised the plastics industry for the general downward trend of plastics prices owing to competition, but condemned the industry for not producing a simplified nomenclature and providing readily understandable data on the properties and applications of plastics.

New York Section Holds Business Meeting

The New York Section began the current season with its annual business meeting on September 20. The meeting, preceded by a cocktail hour and dinner, was held at the Hotel Shelburne, New York, N. Y., and attended by some 25 members and guests.

Vice President G. Palmer Humphrey, G. P. Humphrey Plastics, presided over the business meeting. Following the success of the Group's initial Christmas party last year, it was decided to hold another party on December 20 at the Hotel Shelburne. Arrangements for the party will be handled by a committee under the chairmanship of Winslow A. Ward, American Cyanamid Co., and including Martin Voettlen, Celanese Plastics Corp.; Walter Merck,

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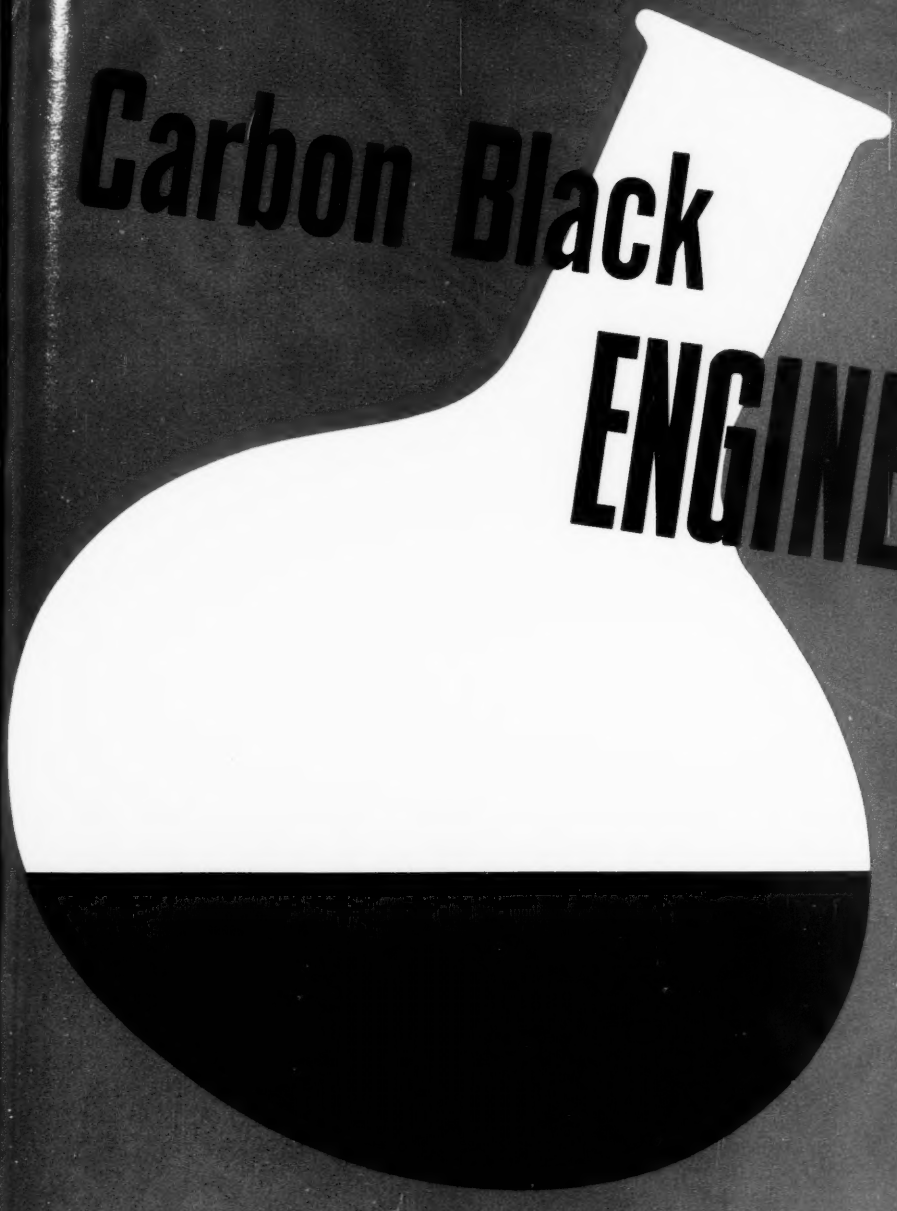

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M. W. Kellogg Co.; and Nicholas V. Fasano, Washington Molding Co.

Mr. Fasano, who is the Group's national director, stated that the directors at their forthcoming meeting will vote on whether the SPE will affiliate with the American Association for the Advancement of Science. After some discussion the Group directed Mr. Fasano to vote against such affiliation at this time, but to recommend that the matter be tabled until the directors' meeting to be held in conjunction with the National Technical Conference on January 18-20, 1911.

Following the business session there was a showing of the American Cyanamid Co. film, "Bull in a China Shop," dealing with melamine tableware. Table favors were distributed through the courtesy of R. C. Molding Co., and the meeting ended with a drawing for door prizes contributed by Riverdale Laboratories and A. Bamberger Corp.

Miami Valley Section Holds Annual Outing

The Miami Valley Section began the new season with its fourth annual outing, held on September 7 at NCR Old River Park, Dayton, O. Everyone participated in the program of miniature golf, shuffleboard, badminton, and horseshoe pitching, which was followed by a buffet supper. National President C. Todd Clark, F. Burkhart Mfg. Co., spoke briefly after supper on the aims of the SPE. Arrangements for the outing were handled by Chester H. Kruger, National Cash Register Co. and Section president, who was assisted by Byron Nelson and H. E. Kniess, both of National Cash Register; Stephen Marcey; and Martin Kasch and Charles Selz, both of Kurz-Kasch, Inc.

Propose Standard for Vinyl and Pyroxylin Coated Fabrics

A PROPOSED Simplified Practice Recommendation for Vinyl and Pyroxylin Coated Fabrics has been submitted to producers, distributers, users, and others for acceptance or comment, it is announced by the Commodity Standard Division, Office of Industry & Commerce, United States Department of Commerce, Washington 25, D. C.

This recommendation was proposed by the Plastic Coatings & Film Association as a result of a survey which disclosed that more than 76 types and styles of vinyl coated fabrics and more than 88 types and styles of pyroxylin coated fabrics were being produced. The principal variations in these types and styles were in finished weights. The simplified list contains 20 styles of vinyl coated fabrics and 25 styles of pyroxylin coated fabrics. For each of these styles the recommendation gives the width in inches and linear yards per pound of the original fabric and the minimum width and weight per linear yard of the coated fabric. The recommendation also contains a table which enables technicians and others to compare the fabrics on the basis of weight per square yard.

Advantages expected to follow general adoption of the recommendation are: concentration of demand by users, with resulting increase in efficiency and decrease in costs of production, handling, and inventory; greater knowledge on the part of customers as to characteristics of each style and its suitability for specific end-uses; more intelligent specifications by purchasers; more intelligent application of the products by purchasers; and elimination of product misapplication. Mimeographed copies of the recommendation are available from the Division.

CALENDAR

Oct.	11-13.	Division of Rubber Chemistry, A. C. S. Hotel Cleveland, Cleveland, O.
Oct.	16-20.	National Safety Congress and Exposition. Chicago, Ill.
Oct.	17.	Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.
Oct.	18.	New York Section, SPE. Hotel Shelburne, New York, N. Y.
Oct.	18-20.	SPI. Annual Conference. New Ocean House, Swampscott, Mass.
Oct.	19.	Quebec Rubber & Plastics Group. Queen's Hotel, Montreal, P. Q., Canada.
Oct.	19-20.	Technical Association of the Pulp & Paper Industry. Paper-Plastics Conference. New York State College of Forestry, Syracuse, N. Y.
Oct.	20.	New York Rubber Group. Henry Hudson Hotel, New York, N. Y. Boston Rubber Group. Somerset Hotel, Boston, Mass. Akron Rubber Group. Hotel Mayflower, Akron, O.
Oct.	24.	Association of Consulting Chemists & Chemical Engineers, Inc. Annual Meeting. Shelburne Hotel, New York, N. Y. Washington Rubber Group. Hotel Washington, Washington, D. C.
Oct.	27.	Northern California Rubber Group. Claremont Hotel, Berkeley, Calif.
Nov.	6.	Philadelphia Section, SPE.
Nov.	8.	Chicago Section, SPE, and Midwest Chapter, SPI. Builder's Club, Chicago, Ill. Newark Section, SPE. Military Park Hotel, Newark, N. J.
Nov.	10.	Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Nov.	14-15.	American Council of Commercial Laboratories. Hotel Waldorf-Astoria, New York, N. Y.
Nov.	15.	New York Section, SPE. Hotel Shelburne, New York, N. Y.
Nov.	16.	Quebec Rubber & Plastics Group. Queen's Hotel, Montreal, P. Q., Canada.
Nov.	24-25.	American Physical Society. University of Chicago, Chicago, Ill.
Nov. 26-Dec.	1.	American Society of Mechanical Engineers. Hotel Statler, New York, N. Y.
Dec.	3-6.	American Institute of Chemical Engineers. Neal House, Columbus, O.
Dec.	4.	Philadelphia Section, SPE.
Dec.	8.	Detroit Rubber & Plastics Group. Christmas Party.
Dec.	11.	Northern California Rubber Group. Christmas Party. The Willows, Orinda, Calif.
Dec.	13.	Chicago Section, SPE, and Chicago Chapter, SPI. Builder's Club, Chicago, Ill. Newark Section, SPE. Military Park Hotel, Newark, N. J.
Dec.	15.	New York Group. Christmas Party. Henry Hudson Hotel, New York, N. Y. Boston Rubber Group. Christmas Meeting. Somerset Hotel, Boston, Mass.
Dec.	16.	Southern Ohio Rubber Group. Dinner-Dance. Miami Valley Golf Club, Dayton, O.

Flexol DOP Non-Toxic

FLEXOL DOP plasticizer has been found to be suitable for use in vinyl plastics which come in contact with many foods, according to Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. This development is based on results of two-year toxicity tests carried out by the company and on studies on the extraction resistance of the plasticizer in vinyl film food wrappings.

Tests conducted under severe conditions have shown that Flexol DOP is remarkably resistant to extraction from films by many foods. It is recommended for use in film wraps for prepackaged lamb and beef, vegetables, cheese, and frozen foods; water and ice bags; milk and beer tubing; intravenous tubing; cap-liner stock coatings; coatings for food conveyer belts; and adhesive for food packages. A special grade of Flexol DOP, designated as Flexol DOP-20, is now being produced in commercial quantities for use in such applications. This grade is laboratory checked for absence of taste and odor, but has the same stability and good low-temperature properties as regular Flexol DOP.

Vinylite and Polyethylene Prices Raised

INCREASES in the prices of all Vinylite and polyethylene resins and compounds, effective September 15, were announced by Bakelite Division, Union Carbide & Carbon Corp., 122 E. 42nd St., New York 17, N. Y. The announcement by G. C. Miller, Bakelite vice president, stated that the price increase for Vinylite resins is slightly under 6%, from a basic price of 34¢ a pound to 36¢; while Vinylite resin compounds reflect proportionate increases. The price of Bakelite polyethylene resins is approximately 4.5% higher, from a basic price of 44¢ a pound to 46¢.

SPI Education Program

THE need of advanced study of the problems peculiar to plastics in the curricula of colleges and universities has long been recognized by the plastics industry. As a result, the committee on plastics education of The Society of the Plastics Industry, Inc., has prepared a booklet dealing with a program for plastics education in science and engineering.

This program consists of three points: (1) colleges and universities should provide all science and engineering students with a general knowledge of the nature and the importance of high polymers by integrating an elementary discussion of their properties in certain existing courses; (2) colleges and universities should provide interested undergraduates with an opportunity to acquire specialized and detailed knowledge of plastics by offering

(*Continued on page 82*)

Scientific and Technical Activities

Symposium on Rubber Finishes

A SYMPOSIUM on "Applied Finishes for Rubber Materials" highlighted the September 14 dinner-meeting of the Southern Ohio Rubber Group. Some 88 members and guests were present at the meeting, held at the Engineer's Club of Dayton.

M. J. Gordon, Gordon Paint Co., acted as moderator of the discussion and also spoke on "Tailoring the Finish to the Job, and the Job to the Finish." Other symposium members were H. R. Bennett, Thresher Paint & Varnish Co., who spoke on "Hard Rubber Finishes"; R. F. Wysocki, Forbes Varnish Division, who discussed "Soft Rubber Finishes"; and Fred Bunn, S. C. Johnson & Son Co., whose topic was "Wax Finishes."

In the business session preceding the symposium, a nominating committee was appointed to select a slate of candidates for election as officers of the Group for the coming year. This committee consists of R. B. Appleby, E. I. du Pont de Nemours & Co., Inc.; C. M. Berger, New Jersey Zinc Sales Co.; H. M. Brubaker, Sid Richardson Carbon Co.; H. R. Gill, Goodyear Tire & Rubber Co.; G. M. Rowland, Inland Mfg. Division, General Motors Corp.; and D. A. Meyer, Dayton Rubber Co.

The Group's next meeting will be a Christmas dinner and dance to be held on December 16 at the Miami Valley Golf Club, Dayton, O.

Korn-Kube—Polishing Medium

KORN-KUBE, a new barrel polishing medium for use on all metals, plastics, rubber, wood, glass, and other materials, has been announced by Kube-Kut, Inc., Garfield, N. J. The new medium is composed of dried maple hardwood in cube form, termed Kube-Kut, to which is now added macerated corn cobs. Both materials are thoroughly screened and aspirated to remove dust, and the mixture combines the high absorption of the sawdust with the tougher polishing action of the pulverized corn cobs. Irrespective of size, materials which can be handled by tumbling barrels can be dried and polished in a minimum of time and at low cost with the new medium, it is claimed. A variety of mixtures and particle sizes of Korn-Kube is available to meet specific conditions.

Consulting Chemists to Meet

THE Association of Consulting Chemists & Chemicals Engineers, Inc., will hold its annual dinner-meeting October 24 at the Hotel Shelburne, New York, N. Y. An open-door meeting, the gathering will feature a symposium discussion on "Public Relations and the Consultant." Paul B. Slawter, Jr., House of Hayden Twiss, will be the speaker, and John Sasso, *Business Week*, will act as moderator. Reservations must be received by the Association office, 50 E. 41st St., New York 17, N. Y., not later than October 21.

New Witco Product

DISPERSO Zinc Stearate, a new product announced by Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., offers the rubber industry a means of coating large surface areas efficiently and economically without the dusting typical of manual operation. The product is an easily wettable white powder which, when added to water with gentle agitation, disperses readily to form a slurry having excellent suspension properties. Rubber sheets or extruded goods immersed briefly into this suspension pick up a thin film of zinc stearate which prevents sticking on subsequent storage. The thickness of the stearate film applied can be controlled by regulating the percentage of zinc stearate in the suspension.

Advantages of the new material over the use of dry powder are: (1) more economical use of the zinc stearate, since a pound of slurry covers a larger area than a pound of dry powder; (2) cleaner operation; (3) savings in transportation costs over zinc stearate pastes; and (4) more complete coverage of the treated rubber area than obtained with powder. A Technical Service Report No. M-7, giving complete information on the properties and methods of application of the new product, is available from the company.

Tlargi Offers Rubber Course

THE opening of the fall semester at Los Angeles City College found the Los Angeles Rubber Group, Inc., course in "Basic Rubber Technology" open for limited enrollment under Rubber Technology I. Beginning on September 20, the course consists of three-hour sessions every Wednesday evening for 20 weeks. A non-credit course, instruction covers the basic technology of the rubber industry, including the fundamental operations of milling, calendering, extrusion, and curing; the elements of compounding and physical testing; and discussion of design principles, specifications, and the economics of rubber manufacture. Raymond B. Stringfield, Fullerton Mfg. Co., and Fred W. Woerner, Los Angeles Standard Rubber Co., are the instructors, and the course is open to high school graduates and employes of the rubber industry.

Making Silastic O-Rings

PRECISION O-rings made of Silastic rubber are available in semi-commercial quantities and in a limited number of small sizes from Frederick S. Bacon Laboratories, Watertown, Mass. These rings provide hydraulic seals said to be resistant to petroleum oils and most hydrocarbons and to display outstanding efficiency under static conditions at both high and low temperatures.

The O-rings are manufactured to the following specifications: tensile strength, 500 psi. minimum; elongation at break, 80% minimum; Shore hardness, 70-75; swell in fluorocarbons, Arochlors, and petroleum oil, less than 6%; and compression set less than 10% after 30% compression for 22 hours at 300°F.

Glacial Acrylic Acid Available

THE first commercial production of glacial acrylic acid, a derivative of beta-propiolactone, was announced by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. According to President W. S. Richardson, this announcement marks the entrance of the firm, a major producer of vinyl resins, chemical intermediates ,and synthetic rubbers, into the acrylic field. Manufacture of the new chemical will begin shortly at the company's Avon Lake general chemicals plant; it will be available in ton-lots from a semi-works unit.

Although acrylic acid was first manufactured 100 years ago, it has not been commercialized to any extent in this country and has been sold in water solution form. Now, for the first time, it will be available in glacial form having a purity over 97% and containing less than 1% water. A clear, colorless liquid, glacial acrylic acid has a molecular weight of 72.02; boiling point of 142° C. at 760-millimeter pressure; melting point of 12-13° C.; specific gravity of 1.048; and refractive index of 1.420. The material, moreover, is extremely active chemically and polymerizes rapidly in the presence of oxidative catalysts.

According to Mr. Richardson, advantages of the glacial product are: (1) it can be esterified directly with any alcohol without time-consuming ester interchanges; (2) although the monomeric aqueous acid is limited to emulsion or aqueous solution polymerization, the glacial form can be used as a monomer or comonomer in polymerizations conducted in organic solvents and in bulk polymerizations; (3) the glacial form greatly facilitates the preparation of salts, both ammonium and metallic types; (4) the anhydrous condition facilitates many addition reactions with the double-bond of the acid; (5) the glacial form is more stable during shipment and storage than the water solution; and (6) shipping of the glacial form offers marked economies in transportation over the water solution.

The new acid is expected to find wide usage in the plastics industry as a monomer, and in the chemical industry in general as an intermediate. High molecular weight acrylate monomers, readily produced from the glacial acid, are polymerized to form products that have extensive use in the manufacture of pressure-sensitive adhesives, and surface coatings for fabrics, wood, metals, paper, and leather. In addition, these polymerization products serve as modifiers in the compounding of plastics and synthetic rubbers.

New Acrylic Polymers

THE availability of a series of acrylic polymers was announced by American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. These modified sodium polyacrylates are water soluble, anionic colloids and are available as clear, straw-colored aqueous solutions. They have interesting properties for use as thickeners, suspending agents, stabilizers, and film formers. A technical data bulletin covering the properties of these polymers and their compatibility with colloids and surface active agents is available from the firm.

RUBBER WORLD
NEWS of the MONTH

All Government Synthetic Rubber Plants to Be Reactivated; Limitation Orders on All New Rubber and Natural Rubber Latex Issued

The almost frantic and sometimes confusing activity in Washington during September and late August in ordering every few days more standby synthetic rubber plants reactivated and new rubber use, including natural rubber latex, curtailed, is reported with special attention to Congressional and Administration figures involved in a special Washington Report by our correspondent, Arthur J. Kraft. The September 5 report of Sen. Lyndon Johnson, Democrat of Texas, in which he recommended a fully reactivated synthetic rubber production program, faster natural and synthetic rubber stockpile accumulation, allocation and specification controls for rubber and rubber products, aggressive research and development on synthetic rubbers, growing natural rubber in the United States, etc., took no cognizance of pre-Korea statements of the rubber industry on many of these points.

Two new operating groups for synthetic rubber plants were formed, one called the Kentucky Synthetic Rubber Corp., and the other a group including Minnesota Mining & Mfg. Co. and Pacific Rubber Co. Included in the reactivation orders were the Institute, W. Va., copolymer plant now to be operated by the B. F. Goodrich Chemical Co. and the Akron copolymer plant, to be operated by Goodyear Tire & Rubber Co., the sale of which plant to The General Tire & Rubber Co. was recently blocked by Senator Johnson. Both of these plants require alcohol butadiene, and several of these types of feedstock plants are being readied for production again.

Total government and private production of synthetic rubber, as now ordered, will be at a rate of 930,000 tons a year during 1951.

The limitation order on new rubber consumption became effective September 1, and a limitation order on natural rubber latex was announced September 20. Some reduction of production activity in the rubber goods industry became apparent, but it was expected that production of military goods, as the synthetic rubber becomes available in November and December, would keep the industry operating at a high level.

A 9¢-an-hour wage increase offered the URWA by The B. F. Goodrich Co. was rejected by the union as "very inadequate."

Rubber Preparedness—Washington Report

ARTHUR J. KRAFT

The government pulled out all the stops in September to set in motion a spectacular build-up in the nation's rubber strength. The first cutback order in civilian consumption and a comprehensive White House order geared the program for possible emergency conditions.

The goal, as set forth by Mobilization Coordinator W. Stuart Symington, is "that the nation may have adequate plans to meet any rubber requirement which might develop." This means all-out synthetic rubber production, accelerated natural rubber stockpiling, and as stringent economic controls as may be necessary for their speedy achievement.

Symington promised further recommendations to the President, based on the planning studies when these are completed. The studies will embrace the need of enlarging synthetic rubber capacity, consolidation and coordination of the entire program, and assessing the nation's civilian and military rubber requirement "in the event of total mobilization."

Symington and the "Johnson Committee"

Guiding the program to full-scale war preparedness status were two tough-minded men, Symington, chairman of the National Security Resources Board, and Senator Johnson, chairman of the Armed Service Preparedness Committee, rapidly emerging as a new "Truman Committee."

Symington, the "take charge guy" President Truman designated coordinator of the nation's economic controls program, laid down the new line in a meeting in early September with his staff, out of which emerged a series of recommendations which the President set in motion as a new rubber program.

"I am one man in Washington," said Symington, "on whom no one is going to pin the label 'too little and too late.'[1] I may even be accused of going too far, too soon, but I'll risk taking that criticism."

The recommendation that Symington brought to the White House on September 13 amounted to a complete acceptance of the program urged upon the Administration a week earlier by Senator Johnson in a comprehensive and tartly worded report entitled, "First Report of the Preparedness Subcommittee of the Committee on Armed Services," dated September 5, in which Johnson scored "complacency on the Potomac as to rubber."

The President, obviously recalling the trying days of 1943 when, as head of the "Truman Committee" of the Senate, he helped guide the Administration out of the difficulties of the rubber program of the early war years, gave Symington his full support.

"I think you are making the right move, and I approve the manner in which you propose to handle it," he said of Symington's "all-out" rubber program.

Others may soon enter the picture. Symington and Johnson both feel the expansion in rubber security needs better topside coordination and direction. Sen. Guy Gillette, Iowa Democrat, has received a green light from Johnson to set his own Agriculture investigating subcommittee to looking into certain aspects of the rubber program as a quid pro quo for a Senate floor speech eulogizing the Johnson committee.

Further to cement his position as *the* "watchdog" over the mobilization program, Johnson has surrounded himself with top-flight investigators and advisers, including a current Securities & Exchange commissioner and former government officials of just below Cabinet rank—men "who can trade blow for blow" with the President's best.

Gillette, who claims credit for forcing the government to place its synthetic rubber program on an alcohol-butadiene basis when petroleum-butadiene was unavailable early in the last war, is again making preliminary inquiries into this aspect of the current rubber expansion. He has made quiet inquiry at the State Department of the functions of the International Rubber Study Group. If his recent investigation of the coffee price rise is any guide, Gillette is probably looking into price control and production restriction as possible functions of the Study Group.

Johnson has already launched a study of whether foreign cartels are impeding the defense effort. His staff is assembling data on the "notorious" Stevenson restriction scheme of the middle 20's, as part of a general inquiry into a great many strategic materials.

Reported, but not confirmed, is that the State Department and Great Britain are endeavoring to find some means, voluntary, if possible, to cut off natural rubber supplies from the Soviet Union. The more drastic step of exclusive government buying, either by the United States or Great Britain, is not seriously considered at this time, according to one informant. Such action would eliminate the free market in rubber.

Senator Johnson, as of September 18, has shown no signs of softening the harsh criticism made in his report of the rubber stockpiling program September 7 and substantially repeated at the September 14 hearing at which Munition's Board Chairman Hubert Howard was present, but did not testify. Johnson called the program "meagerly conceived and meagerly executed," questioned the "diligence" of stockpiling officials, criticized their failure to take advantage of last year's low market price, and broadly hinted that "we need more imaginative and far-sighted men responsible for the attainment of the stockpiling objectives."

Administration officials, while "heartily concurring" on the record with Johnson's views, were disappointed at his claiming the initiative for the build-up in synthetic rubber production and other steps. They also claimed he failed to recognize the recent acceleration of stockpile buying.

Johnson, according to stockpiling officials, was furnished with two estimates—one, the amount of rubber available on the market after civilian demand is satisfied, and, the other, the amount of money the Board was willing to spend on rubber in the current fiscal year. These officials claim that the second estimate represents their acquisition program and that they will make the rubber available through consumption restrictions on all but military goods.

Both estimates were furnished before the Senator wrote his September 5 report. An hour after its publication two others came in from the Board, making the four Johnson claimed are "separate and different."

The rubber goods manufacturing industry, as of September 19, has withheld comment on Johnson's report—a document praised by Alan T. Grant, president,

[1] See India RUBBER WORLD, Aug. 1950, p. 540.

Charles T. Wilson Co., rubber importer, as "one of the finest I have ever read," at the September 14 hearings. Johnson's report took no cognizance of the pre-Korea statements by leading rubber goods manufacturers urging the building-up of synthetic rubber production and inventory.

Administration Moves

With Far East natural rubber coming to market in record quantity, the government has taken the following approach to filling its natural rubber stockpile goal. It consists of these elements:

(1) Buying natural rubber at the market at a far more rapid rate than the "snail's pace" characterizing its buying program up until late August.

(2) Reducing, through Allocation Order R-1 control amendments, consumption of natural rubber in civilian goods.

(3) Stepping up synthetic rubber production to a maximum rate, slightly exceeding the World War II peak, as a measure of insurance should natural rubber sources be severed and, in the meanwhile, to fill the gap for industry's requirement for both military and civilian goods.

Additional steps are also being studied. John Steelman, assistant to the President, writing to Senator Johnson, September 1, suggested that the United States might barter synthetic rubber to foreign countries for natural rubber.

Symington, in his letter of September 13 to the President, announced that the NSRB's studies will encompass the following subjects bearing directly on natural rubber stockpiling:

(1) A realistic objective for (a) a stockpile of natural rubber and (b) an inventory of synthetic rubber.

(2) How the needs of that objective can best and most promptly be met.

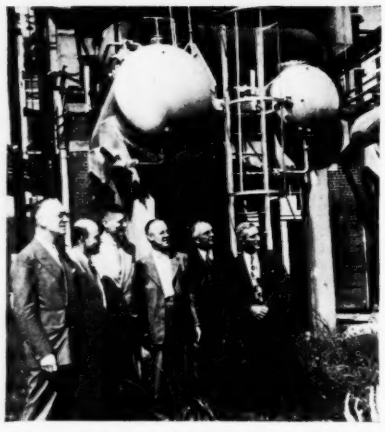
(3) Steps that should be taken to accelerate our acquisitions of natural rubber and to improve our acquisition techniques.

(4) Further steps that should be taken to provide for (a) the production of natural rubber in this country and (b) the procurement of natural rubber from other countries of the Western Hemisphere.

From a producing capacity of about 475,000 long tons a year on July 1, the government's synthetic rubber production was successively ordered up to 575,000 tons on July 7, to 675,000 tons on July 30, to 755,000 tons on September 1, and to 840,000 tons on September 14. Private production adds at least another 88,000 tons (70,000 tons neoprene, and 18,000 nitrile types to this total, which includes 80,000 tons of butyl capacity and 760,000 tons of GR-S. Total programmed synthetic rubber production (government and private) is 929,000 tons.

The July 30 order reactivated two copolymer plants and three petroleum butadiene plants. Minnesota Mining, St. Paul, Minn., and Pacific Rubber, Oakland, Calif., were assigned RFC contracts to open and operate the 60,000-ton GR-S plant at Los Angeles, Calif. This plant was operated during World War II by Goodyear and the United States Rubber Co. During the last war the 3M concern operated, under a joint contract with Goodall-Whitehead, Hewitt-Robins, and Lee Rubber & Tire companies, the 30,000-ton plant of the National Synthetic Rubber Corp. at Louisville, Ky.

The Kentucky Synthetic Rubber Corp., especially organized by ten smaller rubber companies, including two with previous experience in the government program, will operate the 30,000-ton former National Synthetic plant at Louisville. The ten companies comprising this new corporation



Rubber Company Officials at the Kentucky Synthetic Rubber Plant, Louisville, Preparatory to Beginning of Reactivation Activities Which Will Put the $7,000,000 Government-Owned Synthetic Plant Back into Operation by January 1, 1951: *(Left to Right)*: Henry F. Palmer, General Manager of Kentucky Synthetic; A. D. Miller, General Manager of Firestone Synthetic Plants; George F. Goodyear, Secretary of Kentucky Synthetic; George Bruggemier, Firestone Project Engineer; B. J. Oakes, Minnesota Mining & Mfg.; Leo Clifford, Controller and Assistant Secretary of Kentucky Synthetic

are: American Hard Rubber Co., Boston Woven Hose & Rubber Co., Brown Rubber Co., Goodall Rubber Co., Hewitt-Robins, Inc., Dryden Rubber Division, Sheller Mfg. Corp., Simplex Wire & Cable Co., Sponge Rubber Products Co., Thiokol Corp., and Raybestos-Manhattan, Inc. Thomas Robins, Jr., president of Hewitt-Robins, is president of Kentucky Synthetic.

It is believed to be the first time the government has gone outside the tire industry to pick management from the rubber industry for a synthetic plant. The bigger rubber companies have loaned technical assistance, however, and Firestone Tire & Rubber Co. has been engaged by Kentucky Synthetic to conduct the actual "demothballing" of the plant, which will include installation of new machinery necessary to meet new production techniques developed since the end of the late war. The accompanying photograph shows officials of the several companies involved at the Kentucky Synthetic plant in Louisville preparatory to beginning of reactivation activities.

Copolymer Corp. was assigned the 15,000-ton Baton Rouge, La., petroleum-butadiene plant; Shell Chemical Corp., the 25,000-ton Torrance, Calif., petroleum-butadiene plant; and Standard Oil of California, the 18,000-ton butane plant at El Segundo, Calif.

The September 1 order to reactivate another 80,000 tons of GR-S capacity brought in Goodrich Chemical with instructions to operate the Institute, W. Va., copolymer facility at 62,500 tons. RFC has not yet assigned the remaining 18,000 tons.

To implement the same order RFC assigned the Kobuta, Pa., alcohol-butadiene plant to Koppers Co., Pittsburgh, Pa., and the Louisville, Ky., alcohol-butadiene plant to Carbide & Carbon Division, Union Carbide & Carbon Corp., with instructions to operate a unit in each.

President Truman, acting on Symington's recommendations of September 13, the following day ordered the Institute plant to operate at full effective capacity of 112,500 tons. He also ordered the reactivation of the Akron, 30,000-ton copolymer facility, the sale of which to General Tire had been blocked on August 2 under pressure from Senators Johnson and Morse.

RFC signed up Goodyear to operate the Akron plant, a partially cannibalized facility drawing its power from a boiler, built by the government on Goodyear property and since bought by Goodyear. RFC intends to bring two or three smaller companies into the Akron operation as joint operators under Goodyear.

At least four and perhaps five alcohol-butadiene units, each with a design capacity of 20,000 tons a year, but actually capable of producing 160 to 180% of that capacity, will be activated to serve the Institute and the Akron copolymer plants.

Kobuta, expected to be in operation sooner than Louisville, has four such units; Louisville has three.

Goodrich Chemical has not been released from the stipulation in its contract barring rubber production at its Louisville plant, bought from the government after the war. This plant is capable of producing 18,000 tons of GR-S a year as it is now arranged. If the RFC fails to get 760,000 tons of GR-S a year from the government plants so far in operation or to be reactivated, it may ask the Goodrich company to produce for government account at Louisville.

Other Washington Action

Under questioning by Senator Johnson and Committee Counsel Donald Cook, the director of the Office of Rubber Reserve, Gerald B. Hadlock, reported that Edwin Pauley has a "substantial," but not a dominant financial interest in the Pacific Rubber Co. Pauley engaged in the negotiations bringing Pacific Rubber into the 3M operation of the Los Angeles copolymer plant.

Pauley, former treasurer of the Democratic National Committee, high government official, and the man rejected by the U. S. Senate for appointment as Ambassador to Australia, exerted no pressure, Hadlock testified, on the behalf of Pacific Rubber—or none that Hadlock was aware of.

Hadlock defended the selection of all operators. He brought Pacific in because it is, he said, the only independent tire and tube manufacturer on the West Coast, and because Johnson, in reporting the Rubber Act of 1948, urged consideration of smaller rubber companies as operators of synthetic rubber plants.

"I asked Minnesota Mining to take in two or three small companies, but to hold the hand to assure effective operation. There isn't a small rubber company today which can effectively operate a government plant without experience in making synthetic rubber unless it has help."

Johnson ordered Hadlock to place in the record a statement supplying the anticipated fee in dollars in all operator contracts made between ORR and rubber plant operators since the Korean war. He also asked complete data, including all letters and transcripts of telephone conversations by people in or out of government with ORR incident to the 3M-Pacific contract.

ORR estimates that it will continue producing GR-S at about 34,000 tons a month until about November 1, when it expects to reach 50,000 tons a month. The Akron and the Institute plants, as well as the alcohol-butadiene facilities, can be placed in operation in four months, Hadlock reported.

ORR was covered on styrene requirements to the 600,000-ton GR-S program when that level of operations was ordered by the White House. The styrene producers, at that time, were well covered on benzol. The United States Department of Commerce, however, was ready to step in with a benzol allocation order when the President received allocation and priority powers. The President directed the Interior Department to allocate coke by-products, and it was uncertain in the second half of September which Department would allocate benzol.

Johnson and the Administration are both seeking a suitable means of providing alcohol, at least 130,000,000 gallons a year, for the butadiene plants. The consensus of opinion was that it must come from grain and part of it from government-owned alcohol plants. Johnson was casting eyes at the Agriculture Department's high-grade stocks of price-support bought corn. Agriculture is hoping for a large harvest this fall of wet, soft corn, which it does not buy under price support operations.

NSRB, taking a longer view, is looking into "steps necessary to provide the additional feedstock materials for production of synthetic rubber," and "in the event synthetic rubber production beyond that now possible is found to be required, whether the public interest would be served by long-term utilization of presently owned alcohol-butadiene plants or the construction of additional, more economical, petroleum butadiene facilities; and what modernization, improvement and increase of synthetic rubber production facilities should be undertaken."

Production of enough butylenes to operate programmed petroleum-butadiene output is being worked out by the Interior Department and the petroleum refining industry. The same facilities are suited for making alkylates for aviation gasoline, critically short of anticipated military requirements.

The government, in late August, accepted the plan of The Rubber Manufacturers Association, Inc., for reduction in consumption of new rubber from the summer's unprecedented peaks.[2] The reduction, intended only as a four-month stop-gap pending the readying of more stringent controls on natural rubber use, applies to rubber used in civilian goods. The industry's monthly use of new rubber was rolled back approximately 20,000 tons a month, starting September 1, to a level of about 90,000 tons.

New rubber used in filling military contracts and natural latex were exempted from the order (R-1 as amended, August 25, 1950). RMA was asked to recommend a means of making natural latex available for stockpiling. Stringent controls, at first believed necessary, apparently will not be recommended at this time, with reported improved prospects for latex imports.

Whether Commerce will wait the full four months before invoking more stringent end-product controls on bulk natural rubber is problematical. Dr. Steelman, in a letter to Senator Johnson, September 1, had this to say on the timetable of controls:

"Although it is recognized that this system of control limitation on total new rubber consumption for the last four months of this year would not be an adequate method for a longer period or for a more stringent reduction in new rubber consumption, it can be instituted much more quickly than a more detailed controls system and thus result in immediate gains for the stockpile.

"During this four-month interval, however, the Department of Commerce will issue detailed allocation, specification, and inventory control regulations to assure a maximum availability of natural rubber for the stockpile, maximum quality of products with the available supplies of rubber, and an equitable distribution of this supply. These will include prohibition or reduction of non-essential and relatively less essential uses of rubber."

The Commerce Department has already asked its industry advisory subcommittee to recommend end-product controls down the line for the products made by each segment of the rubber goods manufacturing industry. The industry group is to recommend "preference patterns"—a systematic controls system which can be imposed step by step, flexible enough to meet whatever natural rubber consumption reduction is dictated by the stockpiling and other defense situation of the moment.

Whether the controls will be imposed gradually, however, has not been decided. Commerce wants the controls keyed to saving as much natural rubber as possible without seriously impairing product quality.

Probabilities include the elimination of the fifth tire on new passenger cars, elimination of white sidewall tires, elimination of natural rubber inner tubes for passenger vehicles, lighter treads for city delivery trucks, at least as early steps.

The ratio of natural rubber content of automotive tires to total new rubber weight may be fixed at 40% or lower. Present regulations require only that at least 25% of the new rubber be GR-S. Symington indicated on September 18 that he has set his sights on limiting the rubber goods manufacturing industry to 20 to 30% of natural rubber in the combined total natural and synthetic consumption. The industry regarded 40% natural rubber as the most stringent limitation it would be called upon to institute under a partial preparedness controls program. With a 80-20 ratio, product quality may be impaired seriously, resulting in economic waste, man-hour losses, and generally poorer performance.

Meanwhile promulgation of the overall new rubber consumption limit of August 25 brought an immediate flood of appeals for increased quotas. About 300 of the industry's approximately 900 manufacturers of rubber goods have applied for larger quotas.

Commerce's rubber division has been processing these appeals, setting up yardsticks for various categories of appeals. It intends to assure each manufacturer sufficient rubber to operate a five-day week, to prevent, among other things, the loss of their labor forces to other concerns gearing for military production orders.

A number of companies have complained that the base period on which the cutback quotas were assigned, i.e., the year ending June 30, 1950, was a slack period in their line of business. They want the opportunity to meet improved demand for their products. This situation has been especially true of the rubber footwear industry.

Some other appellants have cited newly installed manufacturing equipment, put in before the cutback was envisioned. Several others normally do a large share of their business as suppliers to concerns strike-bound during part of the base period. This situation is true of companies supplying Chrysler Corp., closed by a prolonged strike last spring.

Others, such as the wire and cable industry, had very small production during part of the base period due to shortages of other materials, such as copper. Now they are in a better position on these materials, but need more rubber to lift their producing levels above the abnormally low base-period activity.

Secretary of Agriculture Charles Brannan, in a letter to Senate Banking & Currency Committee chairman, Burnet Maybank, August 29, broadly hinted that the government was thinking of invoking price controls on natural rubber. This point was strongly denied by well-informed officials.

It would appear from the following statement by Symington before the Johnson committee, September 14, that the Administration, having failed to get specific power to fix commodity market prices from Congress, does not believe it has authority to control the rubber market price. Said Symington:

"There is no justification whatever for the rise in the price of crude natural rubber which is just a gambling, speculative commodity. I'm personally disappointed that we didn't get control over commodity markets."

Latex Stockpile Ordered

The National Production Authority, which was set up in mid-September for inventory control and allocation of materials important to the defense effort, announced on September 20 that it would issue a directive requiring that 10% of all natural rubber latex imports be sold to the Munitions Board. The action, agreed upon at a meeting of government officials, rubber consumers and traders in Washington on September 20, was recommended by the Munitions Board following a meeting a few days before with its Rubber Industry Advisory Committee.

The natural rubber latex stockpile goal was set at 10,000 long tons, half of which will be held by the Munitions Board in its strategic stockpile, and the other half to be held by industrial consumers.

The latter will be limited to their average monthly consumption in the 12-month period ending June 30, 1950. Should imports, after the 10% is set aside, exceed the base-period consumption limitation, the excess will be allocated to consumers on an appeal basis.

Latest available figures show industry stocks at 4,753 tons on July 31. The Munitions Board has no latex in its stockpile. Industrial consumption has exceeded imports in recent months. Prospects are for improvement in latex imports.

Allocation Order R-1, As Amended

Allocation Order R-1, as amended August 25, 1950, was issued under the date of August 31 together with a release by Earl W. Glen, chief, rubber division, Commerce Department.

The important new regulations applicable to all consumers of new rubber appear in section 338.80 of the order. They are explained briefly as follows:

The terminology "maximum total new rubber (including natural rubber and all synthetic rubber, but excluding natural rubber latex)" spells out in detail for the purpose of this section only, the kinds of new rubber that must be taken into account in calculating each person's total allowed consumption.

The period involved in this present limitation is from September 1 through December 31, 1950. During these four months, a consumer must limit his total new rubber consumption to 4/12 of the new rubber he consumed during the 12 months beginning July 1, 1949, and ending June 30, 1950. Furthermore in no one month may any person consume more than 28% of the total permitted for the final four months of 1950.

[2] *Ibid.*, Sept., 1950, p. 692.

In addition, a person's consumption during August, 1950, shall be taken into account, as follows, to the extent that a person's August, 1950, total new rubber consumption exceeds 120% of his average monthly total new rubber consumption during the period beginning July 1, 1949, and ending June 30, 1950, such excess shall be deducted from his total allowable new rubber consumption during the last four months of 1950, or to the extent that a person's August, 1950, total new rubber consumption is less than 120% of his average monthly total new rubber consumption during the same base period, his total allowable new rubber consumption during the last four months of 1950 shall be increased by an amount equivalent to such deficiency.

Each person should calculate his maximum total *natural* rubber consumption (excluding natural rubber latex) by subtracting from his maximum allowable total *new* rubber, the total synthetic rubber he *acquires from all sources* during the last four months of 1950. Off-grade, plant clean-up, synthetic rubber should be included in the calculation based on its new RHC content.

New rubber consumed in orders manufactured for the Department of Defense is excluded from the limitation in consumption during the last five months of 1950. In calculating the base for the ceiling for the last four months, new rubber consumed in military orders from July 1, 1949, to June 30, 1950 is not segregated.

In order to encourage production of natural rubber from guayule shrub at this time, such rubber is now excluded in the definition of natural rubber (section 338.71a) and is, therefore, not limited in consumption.

As has always been the case in Allocation Order R-1, any person may appeal from the provisions of the Order by writing (in triplicate) to the Rubber Division, Office of Industry & Commerce, Department of Commerce, Washington 25, D. C., Reference R-1.

The RMA stated immediately that the action of the government in limiting the use of new rubber to a rate equal to that of the year ending June 30, 1950, is in the opinion of the industry a wise one under today's conditions.

Industry spokesmen pointed out that the order does two important things. First, it provides rubber for the civilian economy at the rate of better than the average consumption in 1949. Second, it directs the full impact of the cutback to a reduction in the use of imported natural rubber, while providing a stimulus for increased American production of synthetic rubber. The use of synthetic rubber will be increased above present rates; while the use of natural rubber will be decreased some 35% from present rates.

A. L. Viles, RMA president, commented that the order is the result of long and careful cooperation between the industry and government agencies.

Effect on Industry Production

Some adjustment of production schedules was apparent in September as a result of the rubber cutback. The order itself was being administered from Washington on the basis of a minimum of a five-day work week for companies producing civilian goods only. No lay-offs were anticipated, however, for most companies since reduction of civilian orders would be balanced by military orders for rubber goods.

Goodyear said some departments would be working a five-day week, and others will continue on a six-day schedule, at least for the present. A spokesman for the Goodrich Company said that because of the uncertainty as to the extent of government orders, production schedules will be made on a week-to-week basis. Firestone was still working six days in early September, but future plans for the various departments were still to be determined. Seiberling Rubber Co. announced a five-day week early in September, with all overtime work ending for employes, at least temporarily. General Tire was also expected to go to a five-day week.

It was reported that shoe manufacturers expected varying degrees of difficulty in obtaining rubber soles in the next few months. Most sole manufacturers were expected to stop making crepe rubber soles, and while white rubber soles may still be available, they may be more gray than white, reflecting a shortage of titanium dioxide in this case rather than rubber. While it was considered unlikely that branded and advertised lines of soles will be down-graded, in many cases an increased quantity of reclaimed rubber will be used in certain types of soles and heels.

The Office of Business Economics of the Department of Commerce reported that manufacturers' sales and inventories of rubber goods on a seasonally adjusted and as well as on an unadjusted basis for the months of June and July, 1950, as compared with July, 1949, were as follows:

RUBBER GOODS MANUFACTURERS SALES and INVENTORIES

(Millions of Dollars)

	Unadjusted		
	June, 1950	July, 1950	July, 1949
Sales	387	418	257
Inventories	616	554	620
	Adjusted		
	June, 1950	July, 1950	July, 1949
Sales	367	442	271
Inventories	607	559	625

Figures for sales in April and May, 1950, on a seasonally adjusted basis were also given at 303 and 337 millions of dollars and further emphasize the extent of the boom in the sale of rubber goods during the Summer of 1950.

The Ohio State Employment Service reported in mid-September that Akron rubber goods manufacturing firms had added 2,200 workers, all males, to their payrolls during July and August.

The RMA reported on September 11 that the effects of "scare buying" during July were plainly evident in manufacturers shipments of passenger tires. Recent reports from the field, however, indicate that abnormal buying of tires has ceased as a result of the industry's ability to supply July demands, and statistics for August will probably show a return to more reasonable levels.

Total shipments reached the astounding total of 10,421,758 passenger tires, of which 6,899,459 units were for replacement purposes, and 3,469,768 were to vehicle manufacturers in July. These totals were 18.5% higher than total shipments in June, 1950, when 8,795,891 tires were shipped, and 53% higher than total shipments in July, 1949, when 6,797,024 tires were shipped. Replacement shipments for July of this year were 2,940,954 units higher than a year ago, or an increase of 74%.

Production of passenger tires continued at a high level; the industry turned out 7,103,496 units in July against 7,299,334 in June, a decline, however, of 2.7% from the previous month's output. The record shipments caused manufacturers' inventories to drop to 5,690,302 units from the 8,973,878 units on June 30.

Manufacturers' shipments of truck and bus tires reflected a similar picture. The July total of 1,618,631 units was 15.8% higher than for June and 80% higher than the July, 1949, shipments. Replacement shipments of truck and bus tires during July, 1950, were 117% higher than in the same month a year ago. Production of truck and bus tires during July amounted to 1,160,050 units, compared with 1,169,376 in June. The high level of shipments resulted in a reduction of manufacturers' inventories of 26% to 1,314,398 from 1,774,829 at the end of June, 1950.

Shipments of automotive tubes rose 13.8% to 9,629,335 units from 8,458,233 in June. Production of tubes dropped back to 6,916,496 units from 7,536,925 the month before, and tube inventories declined 25% to 8,422,233 from the 11,248,213 on hand at the previous month-end.

James J. Newman, Goodrich vice president, stated in early September that despite the government's order restricting the consumption of new rubbers, there will be enough passenger-car tires available for all essential civilian uses. According to Newman, passenger-car tire production in the United States this year probably will exceed the 1949 output by more than 10,000,000 units. Production in 1949 totaled 65,140,000 passenger-car tires.

Harold Gray, technical superintendent, tire division, B. F. Goodrich Co., pointed out at about the same time that pound for pound rubber goes further today than it did in 1940. Rubber products still take as much rubber as they used to. Research and development in the past decade, however, have lengthened the service life of both natural and synthetic rubber products.

This year's passenger tires, made with new, improved synthetic rubber, combined with improved carbon blacks, are giving American automobile drivers 15-25% more tread mileage than in 1940. New manufacturing processes were also credited for part of this increase.

Gray's comments were all directed toward the problem of rapidly building up an adequate stockpile of rubber which he viewed with optimism because of the longer service life of present-day rubber products. He advised a reduction of automobile driving speeds, pointing out that the rate of wear 70 miles an hour is about twice what it is at 40. Proper tire inflation, proper balancing, rotation of tires from wheel to wheel, and care exercised in starting and stopping would result in thousands of extra miles from tires currently in use, he said.

Humphreys on Rubber Use

The United States will use more synthetic rubber than natural during the remainder of this year and throughout the year 1951, Harry E. Humphreys, Jr., president of U. S. Rubber, emphasized on September 21.

Synthetic rubber will account for about 54% of the country's total consumption of new rubber in the last four months of this year and considerably more in 1951, he declared. In the first eight months of this year it was about 40%.

"The day may come when the United States will not need any natural rubber. In the meantime, it is better to have an adequate supply of Nature's product to mix with the synthetic rubber where it is needed."

Mr. Humphreys said the demand for some civilian products currently exceeds supply, but the buying surge which followed the outbreak of fighting in Korea has partially subsided. He expressed belief that the rubber industry will be able to take care of essential civilian needs and

at the same time meet all current defense needs provided the public does not engage in extensive precautionary buying or hoarding.

The following figures compiled by U. S. Rubber Co. show the growth of the use of synthetic rubber since the beginning of World War II.

NEW RUBBER CONSUMPTION, U. S. A.
(Long Tons)

Year	Natural	Synthetic (All Types)	Synthetic Ratio % (Approx.)
1941	775,000	6,000	1
1942	337,000	18,000	5
1943	318,000	171,000	35
1944	144,000	567,000	80
1945	105,000	693,000	87
1946	277,000	762,000	73
1947	563,000	559,000	50
1948	627,000	442,000	41
1949	574,000	414,000	42
1950 (Jan.-Aug.)	485,000	326,000	40
1950 (Sept.-Dec.)	170,000	200,000	54

Mr. Humphreys said the rubber industry is hopeful that the increase in synthetic rubber production ordered by the Government will act as a balance wheel to stabilize the price of natural rubber. The price of natural rubber has more than tripled in the last year, making it necessary to boost the price of finished products. The following figures show the price trend during the last year for No. 1 RSS delivered in New York:

Month	Aver. Price per Lb. ¢	Month	Aver. Price per Lb. ¢
1949		1950	
Oct.	16	Apr.	23
Nov.	17	May	28
Dec.	17	June	30
1950		July	40
Jan.	18	Aug.	52
Feb.	19	Sept. (to Sept. 15)	55
Mar.	19		

World Rubber Production and Consumption

The Department of Commerce, reporting on estimates of the Rubber Study Group, pointed out on September 8 that spurred by the highest rubber prices in 25 years, world rubber production of natural rubber set a new record in July for the second month in succession, reaching 167,500 long tons, 10,000 tons more than in June.

For the first seven months of this year, production was estimated at 987,500 tons, 170,000 tons, or 20.8%, greater than in the same period last year. In January-July, 1950, world production of natural rubber exceeded consumption by 55,000 tons.

Malayan output in July was about 65,600 tons, the highest figure since January, 1949. For the first time this year the 1950 cumulative production figure for Malaya, at some 388,000 tons, exceeded the corresponding months' 1949 figure of 381,171 tons.

Indonesian exports in July were estimated at 71,085 tons, an all-time high, and included 22,606 tons of estate rubber. The January-July, 1950, export figure of 346,636 tons (256,609 native) increased 133,677 tons, or 62.8%, over the figure for the corresponding period of 1949 and was only 6,252 tons short of the January-July, 1941, mark of 352,888 tons. Indonesian exports for the year 1941 reached the record total of 635,981 tons, a figure that will be surpassed if shipments in the last five months of this year average 58,000 tons a month. In April-July of this year they averaged more than 64,700 tons a month.

In June-July the Indonesian native rubber exports alone averaged 50,000 tons a month. The destruction by fire in early August of Singapore remilling facilities for wet rubber will hamper further increase.

World new rubber consumption in July, influenced by the decline in the United States, fell below the 190,000-ton level of the two preceding months, being estimated at 182,500 tons, of which 137,500 tons were natural rubber, and 45,000 tons synthetic.

For the first seven months of 1950 new rubber consumption was estimated at 1,232,500 tons (a record), of which 932,500 tons were natural (a record) and 300,000 tons were synthetic. Included in these consumption figures were estimated imports of natural rubber into Russia amounting to 7,500 tons in July, 1950, 35,000 tons in January-July, 1950, and 72,500 tons in January-July, 1949.

Synthetic rubber production in July was estimated at 47,500 tons, the highest level since March, 1948. The January-July, 1950, output was estimated at 277,500 tons, as against 274,022 tons in January-July, 1949. Russian output is not included in these figures.

World stocks of natural rubber, excluding Russian holdings, and excluding government stocks in the United States, the United Kingdom, and France, were estimated at 717,500 tons at the end of July, down 7,500 tons from January 1, and consisted of 247,500 tons in producing countries, 232,500 tons in consuming countries, and 237,500 tons afloat. World stocks of synthetic rubber, excluding Russia, were estimated at 77,500 tons, down 32,500 tons from January 1.

Late U. S. A. Rubber Figures

According to the regular monthly report of the RMA, consumption of new rubber during August reached a new record total of 112,602 long tons. This tonnage was 8⅓% higher than the July consumption figure of 103,946 tons and exceeded the previous record established in June, 1950, by about ½ of 1%.

Natural rubber used amounted to 63,741 long tons, 5.5% higher than in July, when 60,394 tons were consumed, and even higher than the June consumption of 63,333 long tons.

The use of synthetic rubber was up more sharply to 48,861 long tons, an increase of 12.2% over July consumption of 43,552 tons and about ½ of 1% higher than the June use of 48,608 tons. Synthetic rubber consumption in August by types showed: GR-S, 38,037 tons; neoprene, 3,942 tons; Butyl, 5,948 tons; nitrile types, 934 tons.

For the first eight months of 1950, rubber goods manufacturers used 815,593 long tons of new rubber, 23.3% higher than in the comparable period in 1949, when consumption of new rubber amounted to 661,385 tons. Of the total new rubber consumed during the first eight months of 1950, 486,626 tons were natural rubber and 328,967 tons were synthetic.

Labor News

As mentioned last month, The United Rubber Workers of America CIO, had notified the Big Four rubber companies of its desire to negotiate another wage increase for its members. Talks between the union and the Goodrich company began in Cleveland, O., August 30, but were broken off on September 12, when the union refused a company offer of a 9¢-an-hour wage increase tied to a proposal to extend the company-union contract one year from its expiration date of February 1, 1951, with provisions for reopening the wage increase question after July 1, 1951.

The union termed the 9¢-an-hour wage increase offer, which included a ½¢-an-hour increase for intra-plant adjustment of wage inequities, "very inadequate." The company indicated that the wage increase proposal would also increase its costs for employe vacations, paid holidays, Social Security taxes and pensions, since all of these are based on employe earnings so that total benefits to employes would be 10.6¢ an hour.

It was stated by the union that if a compromise could be reached in the matter of extending the bargaining contract, the union would be willing to resume the discussion of wage increases.

Wage talks between Goodyear and the URWA also were started in Cleveland on September 6, but were also recessed on September 15 until September 26. The reason for both talks being recessed was actually the convention of the URWA, held during the week of September 18 in Cincinnati, O.

From this convention, the only information available on September 20 was that the union was going to have to increase the dues paid by its members or reduce the services given them.

Union President L. S. Buckmaster told delegates, "We will have to either increase our income substantially or cut back sharply the services which our people demand and expect."

At the present time the international union gets 70¢ a month from each member and is forced to pay 83⅓¢ to keep the organization running, The international union had $733,360 in its treasury in March, 1949, but at the end of March, 1950, the total was only $569,704.

Insurance, Pension, and Wage Contracts

A new employe insurance program, paid for entirely by the company, was announced by the American Hard Rubber Co. through its president, Frank D. Hendrickson, on September 7. The program includes life, hospitalization, and surgical insurance. In addition, employes will be able to extend these hospitalization and surgical benefits to cover dependents by paying a nominal sum.

The coverage applies to all office and factory workers at the company's plants in Butler, N. J., Akron, O., and its general offices in New York, N. Y.

Agreement on a pension program and collective bargaining agreement was also reached between Mansfield Tire & Rubber Co. and the URWA late in August. Accord was reached by representatives of the company and the union who had been negotiating since July 17 on a pension program with a monthly minimum of $100 for workers having 15 years of service with the company. Other features of the contract include a modified disability clause, severance pay provision, and joint contributory insurance program.

The regular collective bargaining agreement contains a wage reopening clause.

During September, Boston Woven Hose signed a new contract with the local URWA union granting a wage increase of from 6¢ to 10¢ an hour to its employes, to run for one year.

Also the Rome Cable Corp. on September 7 announced it would raise the wages of its 2,000 production and maintenance employes 6¢ an hour.

Work Stoppages

A wildcat strike at the Goodrich Company in Akron made about 2,000 workers idle for several days in late August. Fifty maintenance workers walked out in protest over a time-study check company representatives were making on the jobs of two mechanics in Plant 4.

A similar-type strike at the government-

owned synthetic rubber plant operated by Firestone in Akron stopped all production at this plant for several days late in August.

Members of the local URWA union at the Passaic, N. J., plant of U. S. Rubber agreed to a new one-year contract on August 28 after a four-day strike at that plant over alleged wage inequities. The new contract provides for increased hourly rates for some employes and adjusts job assignment procedure.

EAST

Reopening Reclaim Plant

A reclaim rubber plant—scheduled to be in full production by early fall—is being reopened in Akron by The B. F. Goodrich Co., according to Vice President T. G. Graham, who said there is a boom in reclaim rubber, and the nation is again turning for help from one of the "unsung hero" industries of World War II.

Current production of reclaim rubber is running at the highest rate since 1943, the peak year of World War II, he added.

Recent government restrictions on the use of crude and man-made rubbers, combined with high prices for crude, are responsible for the reclaim boom which may boost production to 300,000 long tons a year, topping all previous records, Graham explained.

He also revealed that reclaim output, based on normal working schedules, has been virtually sold out during the past few months, and total manufacturing capacity of the reclaim industry will soon be taxed to the limit.

Conner Retires; Van Orden Advanced

Chester F. Conner, manager of industrial products sales for Goodrich, has been placed on the company's retirement payroll, and new appointments have been made in the organization.

Paul W. Van Orden has been named industrial products merchandise manager; Richard G. Cox, manager of original equipment sales; Wilfred A. Smith, manager of molded, extruded, lathe cut, and sponge sales; and George J. Fischer, manager of "V" belts and packing sales.

Conner completed 40 years with the company last March, all in industrial products sales. He started as a sales correspondent. Transferred to the Boston district in 1916, he became assistant district manager there four years later and in 1923 returned to the sales promotion department at Akron. Named manager of sales promotion in 1932, Conner was later manager of distributer sales and merchandise manager before being named to his last post two years ago.

Van Orden has been with the company 22 years, all in industrial products sales. Among posts he has held are those of product manager, manager of hose and belting sales, and for the last two years manager of "V" belt and packing sales.

Cox has been with the company 25 years and in industrial products sales for the last 19. He was manager of lathe cut, molded, extruded, and sponge sales for the last five years.

Smith started with Goodrich as a mail clerk 26 years ago and has been in industrial products sales or engineering for the past 19 years. During World War II he was on the company's Washington staff handling technical problems on products supplied the government. For the last five years he was manager of rubber suspension sales.

Fischer joined the company 16 years ago and has been in industrial products sales 11 years. He served as division operating manager and as manager of hose sales and was on special sales assignments the last two years.

Erecting New Philadelphia Branch

Ground has been broken at I St. and Erie Ave. for the new $500,000 brick and steel building which will house the Philadelphia district offices, central warehouse, and a retail store of the Goodrich company. Scheduled for completion by May, 1951, the new building, which will cost approximately $450,000, will occupy approximately 100,000 square feet of floor space on a three-acre lot. Facing Erie Ave., the structure will be two stories, extending back 90 feet, and the remainder will be one story. There will be approximately 80,000 square feet devoted to warehousing, 11,000 to the district offices on the second floor, and 6,000 to the retail store on the first floor.

Guy Gundaker, Jr., field sales manager for BFG, said the new structure will be the company's largest warehouse in the East.

Wilson C. Bray, eastern division manager for the rubber company, said that the units of the company which will occupy the building are the replacement tire sales division which merchandises tires, batteries, and other auto and home equipment; industrial products sales division, which handles belting and hose of all types and other industrial equipment; shoe products division, which sells rubber soles, heels, and other products to shoe manufacturers and repair shops; and the Hood division, which distributes rubber footwear and flooring.

For Better Employe Relations

Formation of an employe and public relations division of Wyandotte Chemicals Corp., Wyandotte, Mich., was announced September 6 by Robert B. Semple, president.

George H. Baker

The new division will coordinate all human relationship activities of the company, which is a major producer of industrial chemicals.

George H. Baker, recently active with American Potash & Chemical Corp. in similar activities, will head the new division. Prior to entering the chemical industry at the close of World War II hostilities, Baker was a colonel and assistant to Major General Lewis B. Hershey, director of Selective Service.

"In establishing this new and broader function of management in Wyandotte Chemicals," Semple explained, "the company is giving recognition to the fact that the problems of personnel administration, plant-city-community relations and general public relations, as well as employe development and recruitment warrant staff representation on a par with production, research, sales, and finance."

Expanding Its Chemical Plant

A substantial expansion of Goodrich Chemical's general chemicals plant at Avon Lake, O., will commence immediately, it was announced by W. S. Richardson, president of B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O. The new manufacturing facilities will produce Geon polyvinyl chloride resins, increasing the company's productive capacity to meet any future military requirements, as well as the growing demands of industry.

In World War II vinyl resins were high-priority materials used as flameproof insulation on Navy shipboard wire and cable circuits and Army Signal Corps equipment, grommets and gaskets for aircraft and motor vehicles, coatings on such products as oxygen tents, hospital sheeting, raincoats, protective clothing, etc.

"The vinyls are certain to assume a vastly greater role than before because of a tremendous growth and diversification of the industry within the past five years, making a host of new products available in volume at low cost," Richardson stated.

The new plant, to be completed in mid-1951, will cover seven acres on the company's 225 acre tract at Avon Lake, 22 miles west of Cleveland, where at present are a general chemicals plant, experimental station, and, currently under construction, an applied research laboratory. The vinyl resin plant will consist of two buildings: a three-story process building (40,000 square feet) and warehouse.

Hewitt Advances Executives

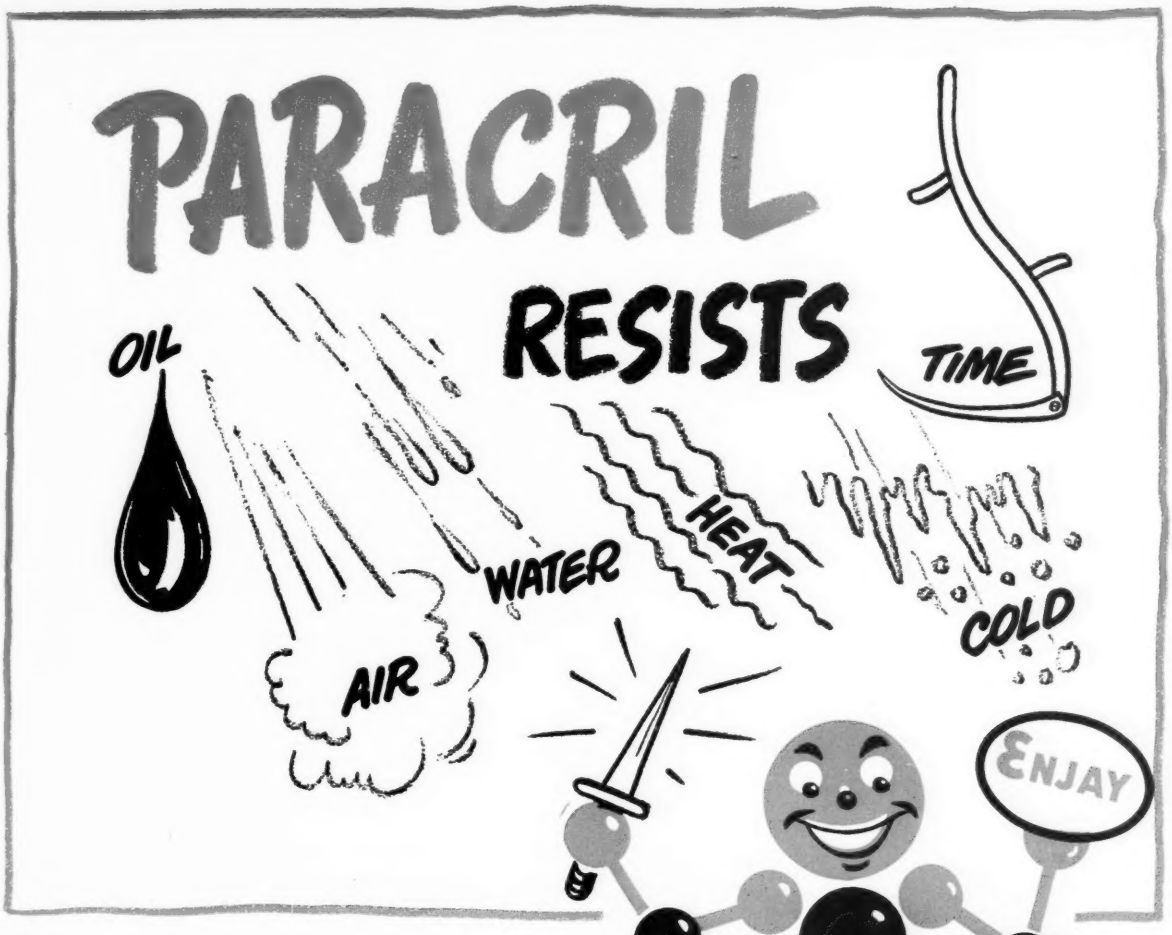
Three shifts among executive personnel of Hewitt-Robins, Inc., were announced September 21 by Thomas Robins, Jr., president, who said the realinement was another step in the company's program further to centralize overall responsibility for operations in New York.

Vice President B. T. Moffatt, New York, was named general manager of Hewitt Rubber and Robins Conveyors divisions besides his previous responsibilities, which included supervision of sales for these two divisions.

W. H. Watkins, Buffalo, formerly controller, was appointed treasurer.

Ellis B. Gardner, New York, former assistant controller, was named controller.

The company operates two plants in Buffalo, N. Y., and one in Passaic, N. J. Its executive headquarters are at 370 Lexington Ave., New York 17, N. Y.



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Transfers Printing Materials Activities; Expanding Ustex Production

Sales and technical service activities for printing materials have been transferred from New York to Providence, R. I., by the United States Rubber Co., Rockefeller Center, New York 20, N. Y. The move is aimed at closer coordination between sales and production, Leslie Ackerman, manager of the printing materials department, said. Headquarters in Providence will be at the company's plant at 355 Valley St. Printing materials manufactured by the company include: offset blankets, endless blankets, textile printing blankets, engraver's gum, unvulcanized gum, vacuum frame blankets, newspaper cutting rubbers, newspaper blankets and inking rolls.

New equipment is being installed at U. S. Rubber's Winnsboro, S. C., plant to double the production of Ustex high-strength cotton yarn, now in greatly increased demand for Air Force parachute harness webbing. The new equipment is expected to double the production capacity by November. In an effort to fill these military needs, the Ustex department at the plant is working on a seven-day, three-shift schedule. Since the outbreak of the Korean conflict the company has produced enough Ustex yarns for between one and two million yards of webbing.

The company also reported that its textile division has been awarded Navy contracts for 134,000 yards of cotton duck for probable use in sea bags. The fabric is to be produced at the Reid Mills, Hogansville, Ga., plant which turned out large quantities of cotton duck during the war.

U. S. Rubber Shifts Personnel

J. Scott Brown has been made chief engineer for the Naugatuck Chemical division. He will supervise engineering operations in the synthetic rubber plants operated by the division in Naugatuck, Conn., Port Neches, Tex., and Borger, Tex., and will also supervise engineering activities in the Marvinol vinyl resin plant at Painesville, O., and the Naugatuck Chemical plant at Naugatuck. Mr. Brown first joined Naugatuck Chemical as a mechanical engineer in its explosives department in April, 1942, became chief maintenance engineer of the explosives department in March, 1943, became plant engineer of the synthetic rubber plant at Naugatuck in February, 1944, and plant engineer of the Naugatuck Chemical plant in November, 1945. Prior to joining U. S. Rubber he had been employed by Carbide & Carbon Chemical Corp. and Blaw Knox Co.

Appointment of Henry A. Rome as manager of special products sales, William C. Hall as manager of molded goods sales, and Thomas S. Savoury as manager of flooring sales for the mechanical goods division, all with headquarters at the Passaic, N. J., plant, was announced September 12.

Mr. Rome heads sales of lathe and wrapped goods, extrusions, handmade rubber tubing, Uskon conductive rubber, industrial products and specialties made of Enrup, the company's new thermosetting plastic.

Mr. Hall supervises sales of light molded goods such as biologicals and pharmaceuticals, milking machine parts, diaphragms, electrical plugs, molded gaskets and seals.

Mr. Savoury is in charge of sales for sheet flooring, stair treads, rubber matting, and other flooring specialties.

Joseph A. Payette has been advanced to manager of field sales, manufacturer's sales division, with offices in the Detroit, Mich., plant. He began his career with U. S. Rubber in February, 1928, and has been employed in the field service department of the tire division as a field engineer and as a special representative of the original equipment sales department. Prior to his promotion and for the past three years, Payette was manager of farm tire sales to original equipment accounts. During the war he was a special representative for the company's tire division at Wright Field.

K. F. Morlen has been appointed manager of the cycle tire department at Detroit, to succeed Noel Lanham, who had the job since 1942. Mr. Morlen started with U. S. Rubber in 1934 when he entered two years' practical training in tire engineering and service. He served as a field engineer for two years until 1938, as a sales representative, as district sales manager at Detroit and Chicago, and as general service manager for the Tire Division with offices at Detroit (1949). During the late war he was in the Armed Forces and was commissioned in charge of tire maintenance for the Naval Air Force. Previously he had been assistant manager of airplane tires up until the time he enlisted.

Mr. Morlen will be assisted in his new job by Larry Goodrich, previously assistant manager of cycle tires.

Curt Muser has been named district manager for U. S. Tires at San Francisco, Calif. Starting as a sales representative at U. S. Rubber in 1938, he has also served as manager of the cycle tire department, manager of the battery and accessory department, merchandising manager of U. S. Tires division, and since 1947 as advertising and sales promotion manager for U. S. Tires.

Clifford H. Shirley, with the company's advertising department since 1944 and since 1948 assistant to Muser, succeeds him as manager of advertising and sales promotion.

Ten recent graduates have joined the scientific staff at U. S. Rubber's general laboratories in Passaic, N. J., according to S. M. Cadwell, director of research and development. The new men are: C. C. Alfieri, Purdue University; G. H. Brice and R. W. Palizay, University of Rochester; Wm. Cummings, University of Minnesota; F. G. Drout, Bucknell University; J. D. Elmore, Hampden-Sydney College; Theodore Ether, Queens College; B. E. Jacobs, University of Vermont; M. W. Miller, University of Wisconsin; and R. J. Thompson, Pennsylvania State College.

The company has also announced the following organization changes in its tire division.

H. R. Mack has been appointed field manager—sales, with headquarters in New York. He started with U. S. Rubber in 1937 as a sales representative in Buffalo, became district manager there in 1938, moved to the New York office in charge of transportation maintenance (truck tires) in 1942, became manager of truck tire sales on the Pacific Coast in 1945, returned to New York in 1946 as district manager, and since then has served as division manager in New York, merchandising manager and manager of truck tire sales in the general offices in New York.

J. S. Berry succeeds Mack in the latter capacity. Berry has been district manager, U. S. Tires, at St. Louis since 1949. Prior to that time he was with the field service and engineering division in Detroit, Pittsburgh, and Kansas City.

W. B. Swartz moves up to Berry's former position in St. Louis. Swartz who started with the company as a sales representative in New York, filled the same position in Newark in 1947, transferred to Boston in March, 1949, became a district retail promotion man, in September, 1949, was assigned as a truck tire sales representative, and since December, 1949, has been in the New York office as assistant manager of truck tire sales.

C. R. Schlicter has been appointed manager of farm market sales, with headquarters in New York. Schlicter began with U. S. Rubber as an assistant in the advertising department in May, 1935, and served as such until August, 1943, when he entered military service. He returned to the advertising department in November, 1945, was transferred in December to Los Angeles as field representative of the department, and since May, 1948, has been in charge of special projects and field promotion.

H. R. Irwin, who joined the company as a farm tire representative in September, 1948, at Des Moines, returns there as assistant manager, farm market sales. Since August, 1949, Irwin has been in the New York office as manager, farm market sales.

"25-Year Club" for Los Angeles Plant

A "25-Year Club" has been organized at the Los Angeles, Calif., plant of U. S. Rubber, and all employes eligible for club membership were guests of the plant management at a dinner to signalize the event, including 64 men and women with a record of 25 years or more with the company, and seven former employes now on retirement pensions.

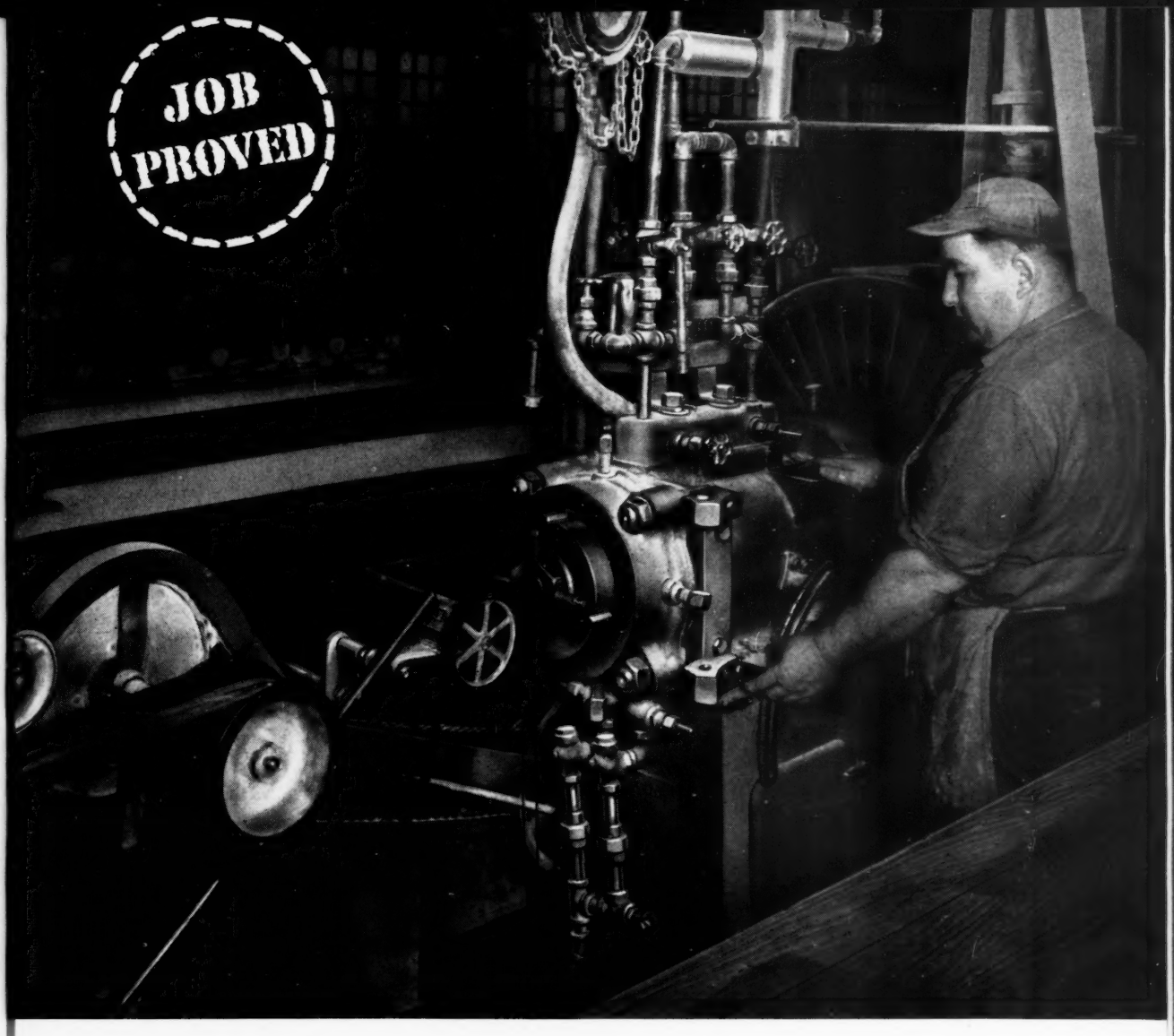
Chairman at the dinner-meeting was R. E. Behrman, factory manager; and among the speakers was P. J. McGovern, director of public relations for the company, who pointed out the importance of long service and the benefits that accrue to employes as a result.

Officers of the new club elected for the ensuing year are: Mr. Behrman, president; A. F. Pond, vice president; and W. H. Conner, secretary-treasurer.

Surfa-Sealz for Massachusetts Roads

Massachusetts is leading the nation in the adoption and use of rubber in roads. A 5½-mile four-lane "rubber" highway, the longest of its kind in the world, was formally opened to traffic on September 1 by W. F. Callahan, Commissioner of Public Works, and other state highway officials. Heretofore the use of rubber in roads has been limited to test sections ranging from 100 feet to 1½ miles in length. The new rubberized highway, on U. S. Route 1, extends from North Attleboro, Mass., south to the Rhode Island state line. Laid over an old and badly patched concrete base at an approximate cost of $200,000, the new road is constructed of a combination of asphalt and Surfa-Sealz, the meltable rubber compound developed by the Naugatuck Chemical Division.

Thomas H. McConnell, Jr., has been appointed sales promotion and advertising manager, in charge of all new business, for Vulcan Rubber Products, Inc., manufacturer of industrial rubber coated fabrics, Brooklyn, N. Y. Prior to joining the company in 1948, Mr. McConnell had been with Standard Oil Co. (N. J.) and Standard Vacuum Oil Co., as an aviation representative traveling extensively in Europe, Africa, and the Orient.



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Report from Intercontinental

Intercontinental Rubber Co., Inc., 50 Broad St., New York 4, N. Y., in its recent semi-annual report to stockholders revealed the resignations of C. L. Baker as chairman of the board of Intercontinental and of Continental-Mexican Rubber Co. and of A. W. Edelen, Jr., as president and a director of both companies. Mr. Baker, however, continues as a director in both concerns.

E. G. Ackerman has been named to the chairmanships; while J. H. Linxweiler has been elected to the vacated presidency. Mr. Ackerman is a member of the industrial management firm of Stevenson, Jordan & Harrison, which last year made a survey of Intercontinental's Mexican properties. Mr. Linxweiler was an officer of the company for many years prior to 1947 and since then has continued to serve on the board.

Operations in Mexico are under R. D. Ross, vice president of Continental-Mexican, who has been active in the management of that company at Torreon and elsewhere in Mexico for many years.

The company was for some time engaged in an operating program at its Torreon plant. Its purpose was primarily to salvage as much as possible from the abandoned cultivation program by harvesting and milling the guayule shrub grown on the company's plantation at Cartagena. The operation was completed, and the Torreon plant shut down July 9; 1,651,400 pounds of rubber were produced, of which 1,369,400 pounds of guayule rubber were from cultivated shrub and 282,000 pounds from wild shrub. If a sufficient supply of wild shrub should be available, and market conditions warrant, the Torreon plant may be reopened this fall to convert the shrub into rubber.

The company's Cedros plant remains closed, but has not been dismantled pending reexamination of the shrub supply in that area. The plant at Catorce, however, has been dismantled, and most of its equipment sold; sale of land and buildings is now being negotiated. The land and equipment at Cartagena, originally purchased for the company's now abandoned cultivated shrub project, recently was also sold.

Intercontinental's Sumatra plantation has shown progress under the limited program undertaken. In the first half of the current year about 125 tons of rubber were sold. But the company does not feel that under present circumstances the venture will prove profitable and therefore hopes to dispose of this plantation.

Berkey Elected to the Board

Admiral Russel Stanley Berkey, USN Retired, has been elected a director of Bill Brothers Publishing Corp., publisher of India RUBBER WORLD, *Tires Service Station, Premium Practice & Business Promotion*, and *Rug Profits*, and affiliated with the publishers of *Sales Management, Grocer Graphic, Yankee Food Merchant*, and *Fountain Service*.

Admiral Berkey, before his recent retirement, was Chief of Information, U. S. Navy, Washington, D. C. Prior to that he had been Commander, U. S. Naval Forces, Far East, with headquarters at Tokyo, Japan, and later commander of the Seventh Task Fleet in Pacific waters.

Admiral Berkey was graduated from the United States Naval Academy in 1912, fifth in his class. In World War I he served on the *USS New York* with the British Fleet. In World War II he saw

Adm. R. S. Berkey

combat service in the Aleutians, Tarawa, Wake, Bougainville, Kwajalein, Wotje, Surigao Strait, Leyte, Lingayen, Mindoro, Mariveles, Bataan, and Corregidor. He holds the Navy Cross, Navy Distinguished Service Medal, Army Distinguished Service Medal, and Legion of Merit with two gold stars.

Opens Washington Office

Seiberling Rubber Co., Akron, O., is enlarging its government sales department and has opened a Washington sales office.

James H. Higgins, who has been in charge of manufacturers' sales, was named manager of the new federal government and manufacturers' sales department, with headquarters at Akron.

Harry H. Slevin, formerly manager of Auto-Lite of Georgia, Atlanta, Ga., was appointed special representative for Seiberling and will be in charge of a new office at 1025 Vermont Ave. N. W. in Washington.

William F. Firick, previously in charge of government sales for the company, was named operations manager of the department. Carl J. Figenscher, formerly a member of the truck tire sales department, has been transferred to the department as a sales representative.

Higgins and Slevin both served with the Office of Rubber Director in Washington during World War II. Higgins was assistant director of operations during most of the war, and Slevin served for a year and then went into the Navy.

American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has announced that its Bridgeville, Pa., plant recently presented an eight-acre community park to the town under a token lease of $1 a year. The plot was originally unused land owned by the company, and when the management recognized the need of such a park in the town of Bridgeville, the company cleared and leveled the land, planted grass, and enclosed the area with a rustic fence. Other facilities include a flagpole, picnic tables, fireplaces, disposal cans, and rest rooms. At other plant locations of the company, recreational facilities have been made available to the people of those localities.

For More Nylon

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has taken an option on approximately 635 acres on the Neuse River between Kinston and Graingers, N. C., for a new nylon yarn plant. Approximately 1,200 people will be required to operate the plant when completed. Construction work is expected to start early next year, and the project is expected to take about 18 months.

This plant will be du Pont's fourth nylon yarn plant, and the ninth major expansion of its nylon manufacturing facilities since World War II. The world's first plant at Seaford, Del., is being expanded at present, as is the plant opened at Chattanooga, Tenn., in 1948. Both projects are scheduled for completion early in 1951. Several weeks ago the company announced an expansion program for the plant at Martinsville, Va., built in 1941 and enlarged in 1945-46.

Immediately after the war du Pont completed a new plant at Orange, Tex., for the manufacture of nylon's basic chemical intermediates. Construction is under way on a new plant at Victoria, Tex., for the manufacture of additional basic intermediates; while capacity for other basic materials in the production of nylon is being expanded at a unit of the Niagara Falls, N. Y., plant, built in 1947-48.

For More Neoprene

Du Pont also plans a substantial increase in the capacity of its Louisville, Ky., Works to make neoprene, its chemical rubber, Edgar W. Thompson, plant manager, announced last month. The increase will be accomplished both by substituting larger equipment for existing facilities in some manufacturing processes and by a new construction. Some new equipment is being installed now, but new construction cannot be started for about a month.

While it is not yet known what new employment will be created by the expansion, the peak construction force is expected to be in the range of 250 to 500 men.

The plant has a present rated capacity of 60,000 long tons of neoprene a year.

Carbon Black Firm Formed

Organization of a new company, Continental Oil Black Co., was announced last month by R. I. Wishnick, president of Continental Carbon Co., and L. F. McCullom, president of Continental Oil Co., joint owners of the new enterprise. A $1,500,000 plant will be erected at Lake Charles, La., designed to manufacture 25 million pounds annually of high abrasion furnace black from oil.

The announcement followed action by the Louisiana Board of Commerce & Industry in approving a 10-year tax exemption for the new plant.

Contracts for the Lake Charles carbon black plant have been signed, and construction will begin immediately. The plant will be located just east and adjacent to Continental Oil's refinery and is scheduled for completion early in 1951.

Raw material for the new plant will be piped direct from Continental Oil's refinery.

A portion of the output of the carbon black will be funneled into the expanded synthetic rubber production along the Gulf Coast.

Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., will be distributer of the plant's production.

THE STORY BEHIND THE WORD...

SILHOUETTE...

Etienne de Silhouette was known as the most miserly Controller General that France ever had. The story in popular Parisian circles at the time was that he was so close-fisted he would only pay for outline drawings to decorate the walls of his home. These black portraits were derisively called silhouettes.

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First Name in Scrap Rubber.

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BRANCH OFFICES: Akron • Chicago • Boston • Los Angeles • Memphis

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CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCRAP

William I. Caldwell

Caldwell Research Director

William I. Caldwell, since 1937 a member of the research department of Taylor Instrument Cos., Rochester, N. Y., last month was appointed director of research to succeed Nathaniel B. Nichols, who has accepted a position as professor of electrical engineering at the University of Minnesota.

Caldwell took his A.B. in physics from Indiana University in 1929 and then went to Purdue University as an instructor in physics. During this seven-year period he also did graduate work, including research on electron diffraction.

Since joining Taylor, Caldwell's work has been concerned largely with Bourdon springs, and the introduction of a 1200° F. mercury tube system by the company was made possible largely through his work. Recently he has been concentrating on automatic control theory.

During World War II, Caldwell acted as chief physicist on the assembly and testing of double-ended telescopes used in the A-26 bomber plane. He also made studies of the instability in low absolute pressure bellows used in instruments controlling one of the processes for manufacturing atomic bomb materials at Oak Ridge.

He also holds several patents and has written a number of research reports. Caldwell is a member of Sigma Xi, Sigma Pi Sigma, the American Society of Metals, and the American Association for the Advancement of Science.

Dynamometer for Raybestos

Raybestos-Manhattan, Inc., Passaic, N. J., has announced the installation of a new inertia-type heavy-duty dynamometer for measuring to a previously unattainable extent the stopping and the starting qualities of brake linings, blocks, and clutch facings. Said to be the largest of its type in the world, the machine will test materials used in stopping all types of automotive vehicles, railroad trains, airplanes, and off-the-highway equipment, according to Vice President J. H. Matthews. The new dynamometer is especially valuable because of its ability to handle all types of full-size brake assemblies, including those that might be used in the foreseeable future. Equipped with special instruments, the machine will also permit brake tests involving the use of water. Built by William R. Thropp & Sons Co. to Raybestos-Manhattan design, the dynamometer, when fully loaded, can simulate a rear axle brake of a truck grossing 60 tons on three axles. Road speeds in excess of 200 miles an hour can be attained, as well as speeds in the creeping range. All types of brakes, including pneumatic, hydraulic, vacuum, electrical, and mechanical force, can be tested on the apparatus.

Moves Branch; Names New District Manager

Raybestos-Manhattan has moved its New Orleans, La., office and warehouse from 1009 Camp St. to 920 Calliope St. The new facilities will enable the company to serve customers in that area with a more complete stock of belting, V-belts, hose, other industrial rubber products, packings, and asbestos textiles.

P. L. Edwards has been appointed manager of the central district office, Manhattan Rubber Division, in Pittsburgh, Pa., to succeed R. C. Rice, retired. Mr. Edwards has a long background of experience and accomplishment in the sale of industrial rubber products and during recent years served as assistant to Mr. Rice.

Promotions for Sales Staff

Graham W. Corddry has been elected vice president in charge of sales of Titanium Pigment Corp., subsidiary of National Lead Co., both of 111 Broadway, New York 6, N. Y.

K. W. Ericson, western sales manager of the corporation, has been appointed general sales manager, succeeding Mr. Corddry; while H. L. Jungmann continues as assistant to the general sales manager.

John A. Lutz, manager of the technical service department, has been named eastern sales manager, succeeding W. H. Woods, who succeeded Mr. Ericson as western sales manager, with headquarters in Chicago, Ill.

E. G. Burling continues as Pacific Coast sales manager, with headquarters in Los Angeles, Calif.

Earl W. Diener, in charge of the New England territory, has been made district sales manager of the territory consisting of the New York, New England, and Pittsburgh areas. W. F. Malcolm will be in charge of the New England territory, with headquarters in Boston, Mass. He replaces Mr. Diener.

Norman E. Olson, formerly sales representative, is now a district sales manager; his district consists of the Chicago area and midwestern and southern states west of the Mississippi River. Mr. Olson will hedquarter in the Chicao office.

Fred R. Hodgson, sales representative, has been named a district sales manager, with territory consisting of the Cleveland area and midwestern and southern states east of the Mississippi River. His headquarters is Cleveland, O.

W. Schoonmaker continues as district sales manager of the Philadelphia area and southeastern states, with headquarters in Philadelphia, Pa.

James MacGuffie has been appointed manager of the technical service department of Titanium Pigment Corp., with headquarters in New York.

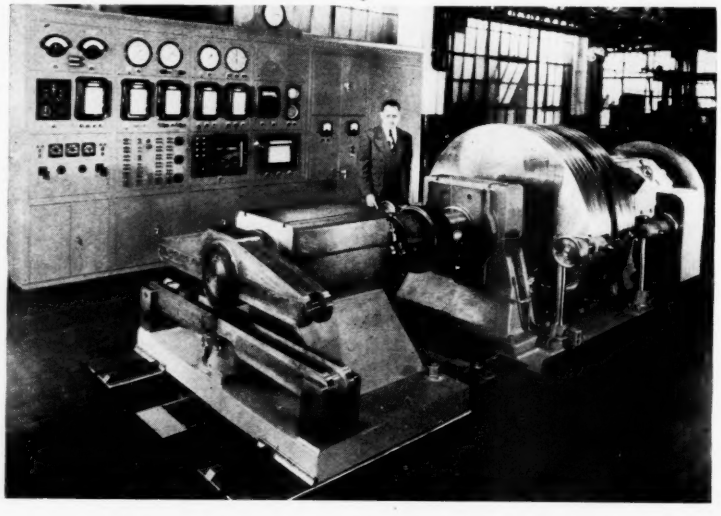
New Tire Plant for Firestone

Construction of a $5,000,000 additional tire plant at Des Moines, Iowa, to keep pace with increased demand for its products was announced September 14 by Harvey S. Firestone, Jr., chairman of The Firestone Tire & Rubber Co., Akron, O. It is expected that the new plant will be in production early next spring. New warehouse facilities are already under construction.

The present Firestone plant at Des Moines is one of the most modern in the rubber industry, and the new plant will also have the latest improvements in efficient production equipment.

The Des Moines plant was built by Firestone for the United States Government in 1944 for the production of tractor tires and heavy-duty truck tires for the Armed Services. After the war the company continued to operate the plant under lease from the government until 1946, when it purchased the property.

Its location in the center of the vast agricultural area of the Midwest enables it to give exceptional distribution service to its customers in that region. Besides Des Moines, the company's other tire plants, at Akron, Los Angeles, Calif., Memphis, Tenn., and Pottstown, Pa., have been operating at capacity for many months.



Raybestos-Manhattan's New Dynamometer for Braking Tests

SYNTHOL

for SYNTHETIC RUBBERS·

TACKIFIER and PLASTICIZER

SINCE the processing time required for GR-S is far greater than that of natural rubber, milling costs have become of paramount concern. **SYNTHOL** is aiding greatly in cutting down this cost by speeding up the "breakdown" and dispersion of pigments. Smooth, nerveless, easy-processing stocks result.

ONE of the outstanding merits of **SYNTHOL** is the excellent, permanent tack it creates in the Butadiene type of synthetic rubbers, without excessive softness. Shrinkage is definitely reduced.

SYNTHOL is vastly superior to messy oils or greases which require much time for incorporation into the rubber. **SYNTHOL** incorporates clean, easily and quickly, either on the mill or in a Banbury. Less bulk is handled, for a small amount goes a long way. Higher quality odorless stocks are produced.

ONLY a small amount is required as compared with most softeners. **SYNTHOL** preserves the full strength of synthetic rubbers and gives stocks of high resiliency and low "heat build-up."

FOR RUBBER CEMENTS: **SYNTHOL** smooths out cement stocks and creates additional tack. It acts both as an extender and tackifier in rubber cements.

A LITTLE **SYNTHOL** quickly "brings back" scorched stocks of both synthetic and natural rubber. It is a unique agent for re-vitalizing "set-up" Neoprenes.

SYNTHOL is an excellent plasticizer for synthetics and when added for tack, replaces an equivalent percentage of plasticizer. Add 2 to 5% of SYNTHOL directly to the batch on the mill. It is clean and easy to use, incorporates with the rubber quickly, does not break the rubber on the roll and is assimilated almost instantly.

- Yields smooth and tacky synthetic rubber stocks.
- No ply separations in built-up stocks.
- Highly dispersable in synthetics.
- Overcomes molding defects incident to dry stocks.
- Lowers shrinkage in raw processed stocks.

USE LESS...ACCOMPLISH MORE...WITH SYNTHOL

QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

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Offers New Plasticizers

Morton-Withers Chemical Co., 2110 High Point Rd., Greensboro, N. C., has announced its new line of Morflex plasticizers and the appointment of sales agents to handle distribution and servicing. The first of the new products is Morflex 100, an octyl phthalate produced under a new process and possessing some unusual properties. The material, it is claimed, has unusually good electrical properties and extreme resistance to heat aging, as denoted by retention of color, light transmission, and elongation. For the first time Morflex 100 makes available an octyl phthalate that in itself will meet Underwriters' Laboratories' aging test on 60, 80, and 90° C. wire. In fact, tests after seven days' aging at 121° C. indicate a drop in elongation of only 7% for a compound containing 50 parts Morflex 100 per 100 parts vinyl chloride. Of special interest to vinyl film and sheeting manufacturers are tests indicating a retention of light transmission after seven days aging at 100° C. of 94%, as compared with only 25% retention for a standard competitive material of recognized high quality.

Three additional Morflex plasticizers manufactured by the same process will be available shortly: an iso-octyl sebacate; an iso-octyl adipate; and a special product designed to give both low-temperature flexibility and high-temperature stability. The company is rapidly increasing its production facilities and expects to reach a rate of 1,000,000 pounds a month by the end of the year.

Sales of Morflex plasticizers will be handled by Burgess Pigment Co. in the New England, New York, upper New Jersey, Chicago, Midwest and Far West areas. Van Horn, Metz & Co., Inc., will handle sales in the Pennsylvania, lower New Jersey, Delaware, and Maryland area; while Morton-Withers will handle sales in the southern areas.

Century Forms Export Unit

Providing more efficient service to a growing number of customers in countries overseas, The Century Tire & Rubber Co., Mansfield, O., has expanded its export service by establishing export headquarters at Akron, O.

The headquarters unit, The Century Tire & Rubber Export Co., 9 S. Main St., Akron, is under the supervision of Vries Gravesteen as general manager.

Century products include a complete range of tires and tubes for passenger cars, trucks, buses, heavy-duty logger tires, and farm tractor and implement rubber. Operating for more than a third of a century, the firm has grown steadily.

Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., its history and development was the subject of a story appearing in the Summer, 1950, issue of *Witcombings*, the company's house organ. Entitled "Witco—The First 30 Years," the story notes that the company observed its thirtieth anniversary on May 4 and has come a long way from the four-man, one-office operation of 1920. Starting as sales agent and distributer of chemical products, the company has expanded until it now manufactures, processes, and markets a large number of light and heavy chemicals, channel-and furnace-type carbon blacks, asphalts and asphalt specialties, driers, and stearates.

Case Succeeds Fry at Gadsden

John M. Fry, technical superintendent of the Gadsden, Ala., plant, has been named technical consultant for operations there and will be succeeded in his present post by C. R. Case, now an assistant to Fry, according to an announcement from the Goodyear Tire & Rubber Co., Akron, O.

Mr. Fry, who recently completed 39 years' service with Goodyear, started as a chemist at Akron, was assigned to Gadsden operations in May, 1929, as development manager, and became technical superintendent in April, 1946.

Mr. Case, who became assistant technical superintendent in February of this year, joined Goodyear in June, 1933, as a member of the company's production squadron, a training organization. He has specialized in tire development and design work and during the war was loaned to the War Production Board as a tire technician.

Anode Buys Plant in Jersey

American Anode, Inc., a division of The B. F. Goodrich Co., both of Akron, O., has purchased the Wayne Knitting Mills plant at Riverside, N. J., according to Robert V. Yohe, Anode president, who also said that present facilities will be increased to manufacture latex products and that the plant will be in operation by June, 1951.

Products and materials in which American-made rubber is used will be produced in the Riverside plant, and more than 200 will be employed there when the plant is in full operation, Yohe added.

Other American Anode plants in Akron, Los Angeles, Calif., and Hollis, N. Y., are now at peak production, he disclosed.

General Tire Promotes Taylor

J. G. Taylor has been appointed director of government operations for The General Tire & Rubber Co., Akron, O. He will supervise all sales activities with all departments of the federal government for General Tire and its affiliates. He will headquarter in Washington, D. C., where he had joined the company 12 years ago as a sales territory representative in Washington and where he had directed the spare parts program for the Navy's Bureau of Aeronautics in the capitol during World War II. Taylor also served with General Tire in New York as special assistant to Eastern Division Manager H. A. Bellows and as sales manager of the company's Memphis, Tenn., branch. He was Akron district sales manager prior to his new appointment. Taylor enlisted in the U. S. Navy in 1942 and was discharged after World War II as a lieutenant commander. For his outstanding work in directing the spare parts program for the Bureau of Aeronautics, Taylor was awarded a merit commendation from the Secretary of the Navy for "outstanding performance of duty for Naval Aviation."

E. P. Lambert Co., Akron, O., formerly representing The South Asia Corp., is now working with United Baltic Corp., 24 State St., New York, N. Y., in the crude rubber end of that corporation.

WEST

New Monsanto Styrene Plant

A new plant, to be the first producer of styrene plastics west of the Mississippi, was recently dedicated at Long Beach, Calif., by Monsanto Chemical Co., St. Louis, Mo. Irving C. Smith, general manager of the company's western division which will operate the plant, was principal speaker at the dedication ceremonies. He noted that West Coast manufacturers will no longer be dependent upon the East for all supplies of styrene plastic and urged California plastics manufacturers to develop new applications for military and civilian use. Other speakers at the ceremonies included C. E. Scott, president of the Long Beach Chamber of Commerce; J. F. Bone, manager of the Chamber's industrial department; Charles Lichtenberg, assistant general sales manager of Monsanto's plastics division; and D. J. Miller, manager of the new plant. The dedication was followed by an exhibition of styrene plastic products in new colors produced in California.

Changes in Executive Personnel

Felix N. Williams, of Springfield, Mass., vice president and general manager of Monsanto's plastics division, has been appointed coordinator of sales for the company with headquarters in St. Louis.

F. A. Abbiati, assistant general manager of the plastics division, succeeds Mr. Williams at Springfield.

Mr. Williams replaces Francis J. Curtis, recently named by Monsanto as director of industrial preparedness. Mr. Curtis will devote his full time to this new department with headquarters in Washington.

Mr. Williams was production manager of the phosphate division before becoming general manager of the plastics division. He had earlier supervised the design and construction of the Monsanto, Tenn., plant, remaining there as manager. He had joined the company in Anniston, Ala., in 1923 and served as manager of the plant there from 1933 to 1936. He became a Monsanto director in 1947.

Mr. Abbiati started with the Merrimac division of the company as a salesman in 1927, was transferred to plastics sales in 1938, was appointed general sales manager of the division in 1944, and assistant general manager in 1947.

Mr. Curtis has been with Monsanto since 1915. He served in various posts in the Merrimac division and was transferred to St. Louis in 1935 to the development department. He was named a vice president of the company in 1943 and was made secretary of the executive committee. He became a director in 1949.

Eli Perry and Robert J. Schatz have been appointed assistant directors of research at Monsanto's plastics division, Springfield, Mass., it was announced by Harold W. Mohrman, director of research.

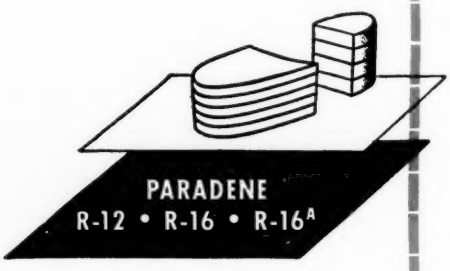
At the same time Mr. Mohrman announced the appointments of Robert W. Jones, Stuart H. Rider, and Roland J. Bourke as group leaders in the research department.

Mr. Perry has been a member of the research staff since 1942, and Dr. Schatz joined the company as a research chemist that same year. Mr. Jones was first employed by the plastics division in 1946; while Mr. Rider has been with the division since 1944. Mr. Bourke came to the research department in 1946.

How NEVILLE can serve the Rubber Industry

RUBBER SOLES AND HEELS

Improve product quality, save production costs, with NEVILLE RESINS



The coumarone resins are used in the manufacture of rubber soles and heels to reduce set and leatherize the compounds. They are extender-plasticizers which do not lower hardness, tensile, modulus or tear. The grades used generally are medium high melting points and of light to dark color, depending on the color of the stock.

The most popular grades, in order of lightest color first, are R-13, R-14, R-15, R-16 and R-16A, and the low-cost, quite dark Paradene No. 2. These resins are also used as extender-plasticizers in compounding the new plastic-type soles.

Why not call on Neville's years of research and experience for help on your rubber production problems?

SILVER ANNIVERSARY NEVILLE 1925-1950

Chemicals for the Rubber Industry

R-42

THE NEVILLE COMPANY
PITTSBURGH 25, PA.

NEWS ABOUT PEOPLE

Ryan Rubber Co. Sold

Ownership of the Ryan Rubber Co., manufacturer of rubber toys, 2401 S. Ervay St., Dallas 1, Tex., has passed to Albert J. Marshall, formerly with Naugatuck Chemical Division, United States Rubber Co. W. G. Ryan, former owner of the Texas company, is retiring from active administration because of poor health, but will remain in a sales and advisory capacity.

Mr. Marshall, upon his graduation from Case Institute of Technology in 1935, found employment with Continental Rubber Works, Erie, Pa. After a brief period in the plant he served, successively, as a salesman, sales engineer in the Philadelphia branch, St. Louis branch manager (1936), and then as Cincinnati branch manager (1937). In 1943, Mr. Marshall joined the Navy. Upon his return to civilian life he took over the Akron area for Naugatuck Chemical, servicing Lotol, Dispersite, Naugatex, and latex. He also was manager of the division's Akron office.

He intends to broaden the Ryan company to furnish a much-needed service in all types of rubber in the fast-growing Texas industrial area.

Kraft Chemical Co., 917 W. 18 St., Chicago, Ill., is now the exclusive Midwest agent for Tyson Corp., manufacturer of rubber substitutes and vulcanized vegetable oils. These products form an addition to Kraft's present large line of rubber chemicals and supplies. Full laboratory facilities are available to supply technical advice, suggest correct substitutes, or match samples.

Minnesota Mining & Mfg. Co., St. Paul, Minn., plans construction of a $250,000 branch warehouse and office building on Elmwood Ave. near W. 117th St. in Cleveland, O. The one-story steel and masonry structure will contain 30,000 square feet of floor space, with outside dimensions 150 by 200 feet. The building will be served by New York Central rail trackage and will have complete truck loading facilities. It is scheduled for completion about January 1.

Minnesota Mining, recently purchased the Big Rock Stone & Material Co., Little Rock, Ark., where the 3M concern has operated a roofing granule plant since 1947.

L. Douglas Weiford

Robert J. Wiseman has been appointed vice president and chief engineer of The Okonite Co., Passaic, N. J. Dr. Wiseman, previously chief engineer, joined the company in 1921 as research engineer. After teaching from 1912 until 1917 at his Alma Mater, Massachusetts Institute of Technology, Dr. Wiseman subsequently served as an engineer with Western Union Telegraph Co. and National Conduit & Cable Co. He is a Fellow of the American Institute of Electrical Engineers, a past president of the Insulated Power Cable Engineers Association, a member of the National Research Council, the American Society for Testing Materials, National Society of Professional Engineers, Passaic Engineering Society, New Jersey Society of Professional Engineers, and the International Conference on Large Electric High-Tension Systems, and U. S. representative in the International Electrotechnical Commission Advisory Committee number 20. Dr. Wiseman is also the author of many articles published in the electrical trade press.

James H. FitzGerald

W. Edward Higbee has joined Testworth Laboratories, Inc., 407 S. Dearborn St., Chicago 5, Ill., as director of research. He has had 15 years' experience in the research, development, and technical sales of special papers, latices, and plastics.

Bert S. Taylor, formerly factory manager of the B. F. Goodrich Co., plastics division, has joined Ohio-Apex, Inc., Nitro, W. Va., as manager of its development department He has been in vinyl plastics sice 1939. Ohio-Apex manufactures plasticizers and chemicals for the plastics industry.

George S. Lamson, manager of the automotive replacement division of the Thermoid Co., Trenton, N. J., recently was elected vice president of the company. Prior to joining Thermoid in 1935, Mr. Lamson had been eastern sales manager for Multibestos Co. He served Thermoid as southeastern division manager with headquarters in Philadelphia and later headed the company's western automotive sales with headquarters in San Francisco. From the latter post he was appointed manager of the automotive replacement division in December, 1949.

Herman F. Mark, professor of organic chemistry and director of the Institute of Polymer Research at the Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn, N. Y., has received, in absentia, an honorary degree, Doctor of Engineering, from the University of Liege, Belgium, in recognition of his many contributions to science.

L. Douglas Weiford, in charge of government relations for Stauffer Chemical Co., 420 Lexington Ave., New York 17, N. Y., has been transferred from the New York office to Washington, D. C. Besides his government work, Mr. Weiford will handle sales development work in the nearby adjacent states. He will make his headquarters at 7210 Ramsgate Rd., Washington 16, D. C.

James H. FitzGerald has been added to the technical sales staff of the Boston, Mass., office of Harwick Standard Chemical Co., Akron, O. Mr. FitzGerald was formerly with the technical staff of the B. F. Goodrich Co., Akron, where his work included testing and development as well as evaluation of raw materials for rubber compounding. He also served at the Goodrich Cadillac, Mich., plant as a chemist on factory processing and control of molded and extruded goods.

Owen J. Brown, Jr., vice president and general sales manager of Godfrey L. Cabot, Inc., Boston carbon black manufacturing concern, was recently elected to membership in the Tufts Alumni Council of Tufts College. He is also chairman of the engineering division in the Tufts Second Century Fund campaign for $4,200,000 now underway. Mr. Brown joined the Cabot organization shortly after his graduation from Tufts College School of Engineering in 1935, where he was president of his class and a member of several undergraduate honor societies.

J. W. Cooley has been named assistant advertising manager of the Wooster Rubber Co., manufacturer of "Rubbermaid" houseware and Kar Rugs, Wooster, O. In his new post he will establish an internal advertising production department and will assist G. G. Johnson, advertising manager of the company. Mr. Cooley will also supervise the company's direct mail and point-of-sale merchandising activities. Cooley was formerly production manager of Osborn Barlett & Associates, Cleveland advertising agency, and advertising manager of Carlisle-Allen Co.

William A. Bohlander has been appointed factory manager of The Hydraulic Press Mfg. Co., Mount Gilead, O. He was previously with Aetna Standard Engineering Co. as superintendent and spent 18 years as master mechanic in charge of maintenance at the Jones & Laughlin Steel Corp. He gained his early machinist and engineering training at the National Tube Co.

Rubber items courtesy U. S. Rubber Company

for
long-lasting
white
rubber

use non-staining,
non-discoloring,
ANTIOXIDANT 2246

For white and light-colored rubber products
where long life with a minimum of discoloration is desired,
we recommend:

ANTIOXIDANT 2246, the most active,
non-staining, non-discoloring anti-
oxidant ever developed.

You'll find that ANTIOXIDANT 2246 gives excellent results
in natural rubber or GR-S stocks.

Write for Technical Bulletin on ANTIOXIDANT 2246.

AMERICAN Cyanamid COMPANY
CALCO CHEMICAL DIVISION
INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY, U.S.A.

Calco®

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N.J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

E. E. McSweeney has assumed new responsibilities as representative to the chemical industry for Battelle Memorial Institute, Columbus 1, O. He will direct relations between Battelle and sponsors in the industry and also assist prospective sponsors of research in setting up their programs. A member of the Battelle staff since 1938, Dr. McSweeney in recent years has directed plastics, rubber, and coatings research. He is chairman of the Division of Paint, Varnish & Plastic Chemistry of the American Chemical Society and serves on other A. C. S. committees and also has been active in the technical programs of the American Society for Testing Materials and the Society of Plastics Engineers.

A. F. Carr recently became manager of Felt Products Mfg. Co., Rubber Division, 1504-14 Carroll Ave., Chicago 7, Ill. He formerly had been associated with Airlastic Rubber Co., Inland Rubber Co., and Dryden Rubber Co.

Richard J. Brown, plastics engineer, has been appointed to the development department of Russell Mfg. Co., Middletown, Conn. Formerly with Rex Corp., he had charge of the development of plastics for textile applications. In his new connection Brown will be concerned with plastics research for many of the Russell commodity divisions, including Venetian blind tape, slide fastener tape, and wide and narrow elastic fabrics.

Robert A. Winters, executive director of The Rubber Heel & Sole Institute, 551 Fifth Ave., New York 17, N. Y., recently was appointed to the Committee on Accident Records, Analysis & Use, of President Truman's Conference on Industrial Safety. The activities of the Conference are administered by the United States Department of Labor.

New Directors for Dominion

Dominion Rubber Co., Ltd., Montreal, P.Q., at its recent board meeting elected the following new directors: H. Wolfhard, G. B. Rutherford, and E. H. White.

Mr. Wolfhard also becomes a vice president and general manager, footwear division, of which he had formerly been general manager. He started with the company in 1912 in its footwear plant at Kitchener, Ont.

Mr. Rutherford is now a vice president and general manager of the mechanical goods division. He had previously been general manager of the division and had first joined the company at its Winnipeg branch in 1915.

Mr. White, who is a vice president of United States Rubber Co., Rockefeller Center, New York, N. Y., U.S.A., has been with that organization since 1903.

SPI Program

(*Continued from page 63*)

elective courses; and (3) graduate schools should offer the means of obtaining advanced research training in plastics by setting up graduate curricula. Copies of the program booklet are available from the SPI, 295 Madison Ave., New York 17, N. Y.

OBITUARY

Lawrence S. Hewes

LAWRENCE STARK HEWES, president and general manager since 1944 of the Rubberset Co., Ltd., Gravenhurst, Ont., Canada, died at is home in Gravenhurst on August 30 of coronary thrombosis.

Born in Westfield, Mass., in 1895, Mr. Hewes attended schools in Springfield, Mass. During World War I he served with the AEF overseas. Upon his return in 1919 he went to Toronto where he joined the Rubberset company, of which his father, F. L. Hewes, was president. During World War II he was director of the brush division of the Canadian Wartime Prices & Trade Board.

A prominent Rotarian, the deceased was also an active member of the community council and a member of the Mount Stephen, National, Seignory, Gravenhurst Curling, and Granite clubs, and the American & Canadian Brush Mfrs.' Assn.

Funeral services were held in Gravenhurst on September 1, followed by cremation.

Surviving Mr. Hewes are the widow, a son, his father, a brother, and a sister.

Frank Phillips

FRANK PHILLIPS, honorary director and honorary chairman of the board since 1949 of Phillips Petroleum Co., Bartlesville, Okla., died August 23 in Atlantic City, N. J., as the result of a gall bladder operation and a weak heart condition.

Funeral services were held August 26 at the family residence in Bartlesville, followed by private interment at the mausoleum at Mr. Phillips' Woolaroc ranch, 14 miles from Bartlesville.

The deceased was born in Scotia, Neb., November 28, 1873, but the family moved to a farm near Creston, Iowa, in 1874. After graduation from the country grade school at the age of 14, Mr. Phillips first found work as a barber and later in a local bank. After service as a bond salesman, at the age of 29 he went to Bartlesville, Indian Territory, and organized and became president of the Citizens Bank & Trust Co., whose business subsequently extended into oil operations.

On July 1, 1917, the deceased and his brother, the late L. E. Phillips, founded and incorporated Phillips Petroleum, and for the first 21 years Frank Phillips was its president. In 1938 he became chairman of the board and retained that position until his retirement in 1949. He then received his honorary appointments.

Founder of Woolaroc Museum, which contains Indian lore and other early Southwest exhibits, the deceased was the only white man to be made a chief of the Osage Indian tribe. In addition he was the holder of the French Government decoration of Chevalier of the Legion of Honor (1928) and received honorary degrees from Kansas Wesleyan University, Oklahoma Baptist University, and Lafayette College. Besides he held many awards, including several from the Boy and Girl Scouts of America and a distinguished service citation from the University of Oklahoma. He also founded Frank Phillips Foundation, Inc., which sponsors higher education for the children of Phillips Petroleum employes. He was also keenly interested in aviation.

Surviving Mr. Phillips are a son, two daughters, three brothers, two sisters, eight grandchildren, and two great grandchildren.

Financial

Minnesota Mining & Mfg. Co., St. Paul, Minn., and subsidiaries. Half ended June 30: net profit, $9,682,389, equal to $4.80 each on 1,976,342 common shares, compared with $6,330,227, or $3.11 each on 1,972,845 shares, in the like period last year; net sales, $65,577,460, against $54,552,850.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. Six months ended June 30: net profit, $1,545,952, equal to $2.46 a share, against $830,849, or $1.32 a share, a year earlier.

Seiberling Rubber Co., Akron, O., and subsidiaries. June half, 1950: net earnings, $581,998, equal to $1.53 a common share, compared with net loss of $247,525 in the first half last year; net sales, $15,130,847, against $11,969,831.

Union Asbestos & Rubber Co., Chicago, Ill. Six months to June 30: net earnings, $135,996, equal to 29¢ a capital share, against $594,017, or $1.20 a share, in the corresponding period last year; net sales, $3,735,704, against $5,387,034.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Com.	$0.50 irreg.	Sept. 30	Sept. 19
	Pfd.	1.75 q.	Sept. 30	Sept. 19
Armstrong Rubber Co.	Com.	0.25 q.	Sept. 28	Sept. 15
	Pfd.	0.59⅜ q.	Sept. 28	Sept. 15
Carborundum Co.	Com.	0.25	Sept. 29	Sept. 15
Faultless Rubber Co.	Com.	0.50 q.	Oct. 2	Sept. 12
General Tire & Rubber Co.	4¼% Pfd.	1.06¼ q.	Sept. 29	Sept. 19
	3¾% Pfd.	0.93¾ q.	Sept. 29	Sept. 19
	3¼% Pfd.	0.81¼ q.	Sept. 29	Sept. 19
B. F. Goodrich Co.	Com.	1.00	Sept. 30	Sept. 8
	Pfd.	1.25	Sept. 30	Sept. 8
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00	Sept. 30	Sept. 11
Johns-Manville Corp.	Com.	0.60	Sept. 8	Aug. 28
Mansfield Tire & Rubber Co.	Com.	0.25 incr.	Sept. 20	Sept. 9
	Pfd.	0.30 q.	Oct. 2	Sept. 15
Mohawk Rubber Co.	Com.	0.25 q.	Sept. 20	Sept. 15
O'Sullivan Rubber Corp.	Pfd.	0.25 accum.	Oct. 1	Sept. 15
Raybestos-Manhattan, Inc.	Com.	0.50 q.	Sept. 12	Aug. 28
Rome Cable Corp.	Com.	0.20 incr.	Sept. 29	Sept. 14
Seiberling Rubber Co.	4½% Pfd.	4.50 accum.	Sept. 26	Sept. 11
Thermoid Co.	Com.	0.15 q. inc.	Sept. 30	Sept. 15
	Pfd.	0.62½ q.	Nov. 1	Oct. 16

Mr. Vinyl Grows Up...

with help from

S/V SOVALOID C

From a scrawny infant weighing in at a mere million pounds to a rugged, 250-million-pound giant . . . that's the story of young Vinyl's phenomenal growth in just ten years! And this great new industry is still growing . . . thanks to an important assist from Socony-Vacuum's highly efficient, low-cost plasticizer — *S/V Sovaloid C!*

S/V Sovaloid C costs but a fraction of the price of conventional ester-type plasticizers, yet gives you many special processing advantages. It adds greater tensile strength to your products . . . imparts excellent flexibility at normal temperatures . . . provides unusual oil-resistant qualities. It is completely compatible with all vinyl compounds, and will not migrate from finished products.

Here's another advantage . . . in many cases, *S/V Sovaloid C* can be used as an extender of more costly plasticizers — again reducing your processing costs and increasing your sales possibilities. Get all the facts about *S/V Sovaloid C* from your Socony-Vacuum Representative.

SOCONY-VACUUM OIL COMPANY, INC.
and Affiliates: MAGNOLIA PETROLEUM COMPANY
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Socony-Vacuum Process Products

Process Products
SOCONY-VACUUM

This Figure Prepared with Vinylite Brand Plastics.

STAMFORD "FACTICE" VULCANIZED OIL

(Reg U S Pat Off.)

Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also to our aqueous dispersions and hydrocarbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

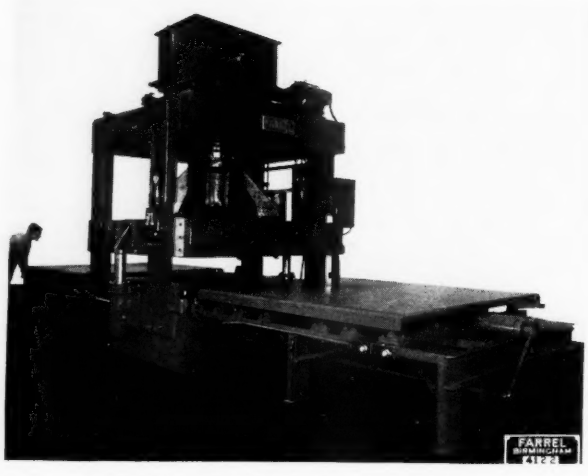
The services of our laboratory are at your disposal in solving your compounding problems.

THE STAMFORD RUBBER SUPPLY COMPANY

Stamford, Conn.

Oldest and Largest Manufacturers of "Factice" Brand Vulcanized Oil Since 1900

New Machines and Appliances



Farrel-Birmingham Auto Mat Trimming Press

Mat Trimming Press

A 125-TON capacity hydraulic press with 84- by 96-inch platens, designed for increased efficiency in trimming automobile mats of the currently used larger sizes, has been announced by Farrel-Birmingham Co., Inc., Ansonia, Conn. The automatic cyclic motion of the press platen and the two tables provides time for removal and placement of stock on one table while the stock on the other table enters the press, is trimmed, and withdrawn. Press and tables are hydraulically operated by separate electrically driven pumping units mounted on the top crosshead together with the oil tank. Inching motion of any one unit is obtained by a selector switch.

The tables operate on roller bearings and are surfaced with hardened steel plates. Adjustable deceleration of table movement assures smooth and controlled action. The reciprocating cylinder has radial ribs extending over the platen area to provide reinforcement against deflection. The upright supports are steel slabs, and the other heavy parts of the press, including the 18-inch diameter ram, are of cast Meehanite. Other design features include an arrangement for quickly changing the knife set-up; outside packing of all rams; adjustable guides on the moving platen; and safety controls to stop all motion.

... remove the nerve...

SEE PAGE 4

Now you can cut losses and maintenance costs—with TIMKEN® bearing equipped calenders

When your calender rolls are precision-mounted on Timken® bearings, you get consistent gage in your plastic sheets. As a result, losses due to rejects and too-thick sheets are sharply cut.

EXTREME PRECISION

Timken tapered roller bearings can be adjusted very precisely at installation to allow for roll expansion caused by heat. Rolls are more rigid. Vertical roll movement is held to a minimum. Calender precision is maintained.

MAINTENANCE CUT

Timken bearings give you still greater savings through lower maintenance costs. Lubrication takes fewer man-hours. Wear on moving parts is reduced.

UNIQUE DESIGN

Thanks to the tapered design and line contact of Timken bearings, they take the heaviest radial, thrust and combination loads. They offer special advantages in calenders, mills, refiners and banbury mixers. For details write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

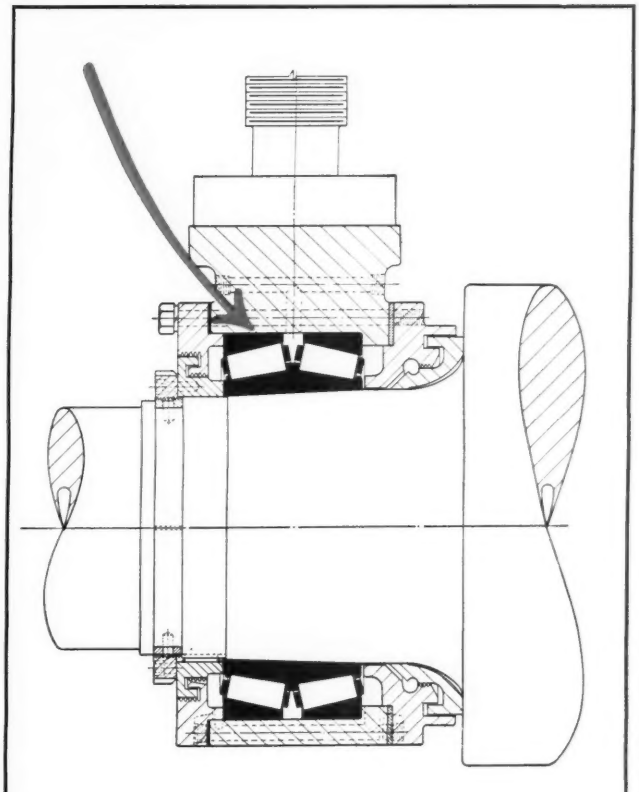
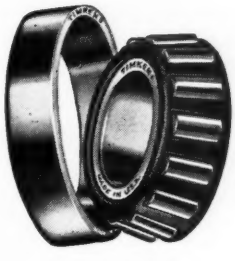


Diagram shows how calender rolls are mounted on Timken bearings

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ↓ AND THRUST →◫← LOADS OR ANY COMBINATION ✳

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QUALITY

R-1599 R-2199 R-2899

...these Pure Light Red Iron Oxides by Williams assure it!

They represent the ultimate in red iron oxide colors for the rubber industry.

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Each is manufactured to rigid specifications for copper and manganese content, pH value, soluble salts, fineness, color, tint and strength by controlled processes and with special equipment. *The result is absolute uniformity of product.*

If you haven't already done so, try these finest of all iron oxide colors. Your own tests will show there is no equal for Williams experience.

LET WILLIAMS PUT THE MICROSCOPE ON *Your* COLOR PROBLEM

Whatever your color problem, bring it to Williams. Our 72-year experience can often save you time, money, and headaches in proper color formulation.

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EXTENDER PIGMENTS

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Black Rock Guillotine-Type Cutter 4M-48

New Guillotine-Type Cutter

THE development of a new guillotine-type cut-off machine applicable to the rubber, plastics, and paperboard industries has been announced by Black Rock Mfg. Co., 175 Osborne St., Bridgeport 5, Conn. Designated the model 4M-48, the machine will cut off stock up to 48 inches in width and in thicknesses up to 1¾ inches, depending on the type of tripping mechanism used.

The machine base is of welded steel construction, and the cutting block is a heavy meehanite casting with sufficient cross-section to support the cutting of thick, tough materials. A 5-hp., 1,200-rpm. motor drives a heavy cast flywheel, which in turn drives the main shaft and operates the knife carriage. The one-revolution clutch arrangement operated through a solenoid trip mechanism lends itself to the use of various types of electrically operated tripping devices made by the company for cutting materials of ¼-inch thickness and up.

Chemical Handling Buckets

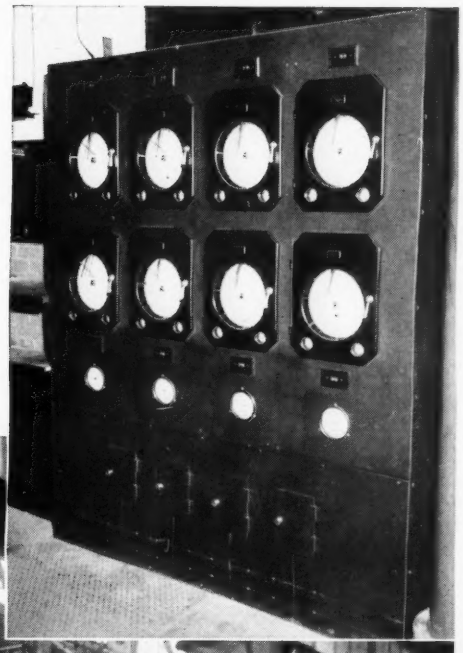
Unbreakable Enrup Bucket for Corrosive Chemicals

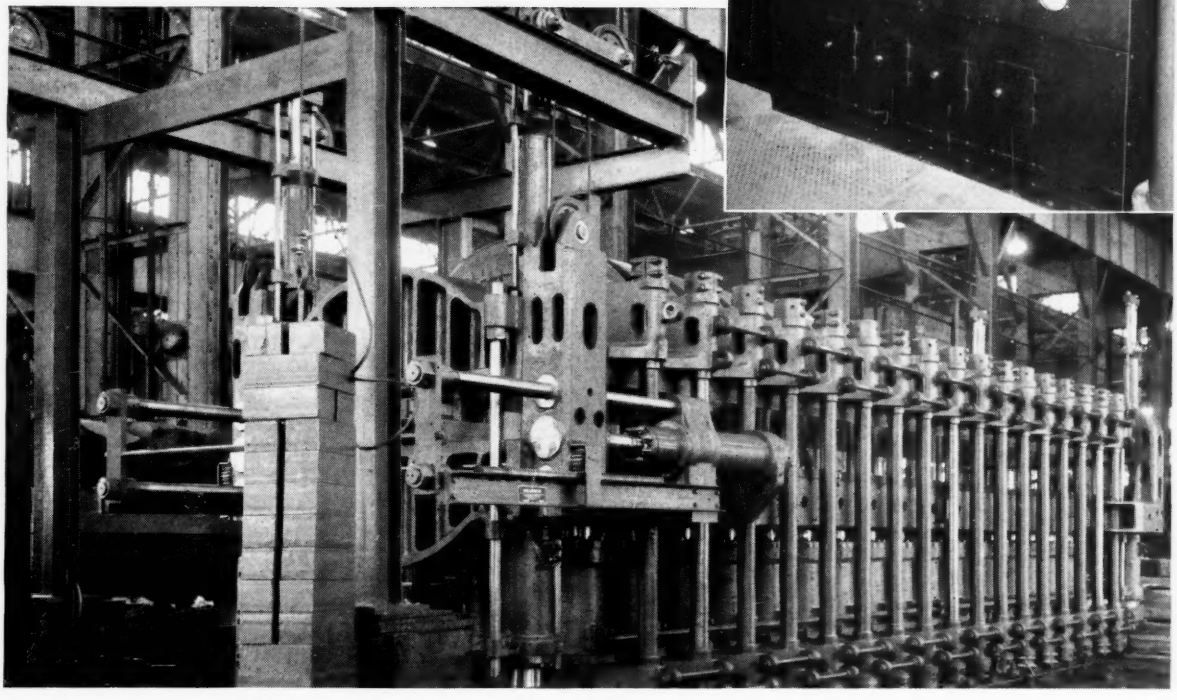
UNBREAKABLE buckets for carrying corrosive chemicals have been developed by the mechanical goods division of United States Rubber Co., Rockefeller Center, New York 20, N. Y. Made of Enrup, a thermosetting blend of plastic and rubber, the buckets are being produced in quantity at the company's Passaic, N. J., plant. The new buckets are lighter and tougher than hard rubber varieties and will not crack or shatter under severe abuse, it is further claimed.

The new carriers will resist aliphatic solvents, all concentrations and types of alkalies, most acids, and other corrosives up to temperatures of 150° F. The buckets are not designed for carrying formic, glacial acetic, or concentrated nitric and sulfuric acids, but will satisfactorily handle concentrations of nitric and sulfuric acid up to 50%. They are not recommended for aromatic solvents, esters, or ketones. The new buckets are being made in a 12-quart size with replaceable Enrup handles.

ON DECEMBER 31, 1949, THE RUBBER BUREAU OF INDO-CHINA was terminated by a decree in the *Journal Officiel* of January 1, 1950. The Bureau was created in 1934 to carry out French obligations under the International Agreement of May 7, 1934. The French High Commissioner in Indo-China is charged with the liquidation of the Bureau; he will also have to decide on measures for financing the operations previously controlled by the Bureau.

Manhattan gets a real belt out of this!





Eight Taylor FULSCOPE Controllers maintaining uniform temperature and pressure on world's largest belt press at Raybestos-Manhattan, Passaic, N. J.

FOR vulcanizing conveyor belts at their Passaic plant, the Manhattan Rubber Division of *Raybestos-Manhattan, Inc.*, recently installed the world's largest precision hydraulic press. Manhattan Rubber engineers selected Taylor FULSCOPE* Controllers to maintain uniform temperature and pressure on each platen of this huge press.

Eight Taylor FULSCOPE* Controllers operating individual control systems are synchronized to hold precisely the right vulcanizing temperature. A **check of several platens shows less than 2° variation in temperature over any one platen surface in spite of big, sudden load changes over an area larger than a bowling alley.**

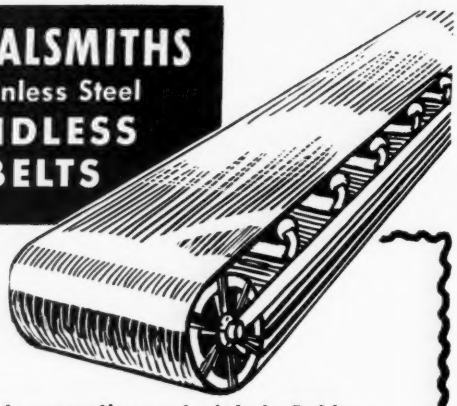
This is another way Taylor Automatic Vulcanizing Control is helping the Rubber Industry keep quality up and costs down. Your Taylor Field Engineer will be glad to explain how our simple, economical instrumentation can help *you*. Ask him! Or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

*Registered Trade-Mark

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

METALSMITHS
Stainless Steel
ENDLESS BELTS



For transporting materials in Rubber, Plastics and other process industries

- Any width required, in one piece
- Welded endless
- Camber and width controlled
- Polished to suit
- Material may be scraped from surface
- Doctor blade will keep belt clean

Let our engineers quote on your needs

METALSMITHS
Division of **Orange Roller Bearing Co., Inc.**
557 White Street Orange, N. J.

The term
"COTTON FLOCKS"
does not mean cotton fiber alone

EXPERIENCE
over twenty years catering to rubber manufacturers

CAPACITY
for large production and quick delivery

CONFIDENCE
of the entire rubber industry

KNOWLEDGE
of the industry's needs

QUALITY
acknowledged superior by all users are important and valuable considerations to the consumer.

Write to the country's leading makers for samples and prices.

CLAREMONT WASTE MFG. CO.
CLAREMONT **N. H.**

The Country's Leading Makers

New Goods and Specialties

Plastiglov Plastic Impregnated Glove

New Protective Glove

PLASTIGLOV, a plastic impregnated glove said to have wear resistant qualities far surpassing those of any rubber coated glove, has been announced by American Rubberizing Co., Minneapolis, Minn. The form-fitting glove is waterproof, snag-proof, heat and flame resistant, and is also claimed to be superior to leather and natural or synthetic rubber gloves with respect to tensile and tear strength and resistance to abrasion, acids, and alkalies. Tests have revealed the ability of the plastic impregnated coating to withstand long exposures to corrosive materials without effect.

Made in standard colors of red, amber, green, and black, with other colors to special order, the new gloves are available in jumbo size for use as work gloves and in all standard sizes for children's mittens.

Plastic Tote Boxes

New U. S. Rubber Tote Boxes Made of Royalite Thermoplastic

A NEW type of stacking and nesting tote box, formed in one seamless piece from its Royalite thermoplastic material, has been announced by United States Rubber Co., Rockefeller Center, New York 20, N. Y. The tote boxes are designed for criss-cross stacking, with adequate locking when stacked, permitting contents to be easily seen. Handles are formed into the roll of the upper lip so that the tote box can be picked up from any side.

All corners are rounded, and the boxes take up little space, are very light in weight and are easy to handle and to clean. The boxes, furthermore, are extremely tough, highly impact resistant, accident-resistant, non-toxic, and have low water absorption of less than 0.5%. These items, being made by U. S. Rubber in its Chicago, Ill., plant, are available in a range of widths and depths and in four colors to permit ready identification.

New Athletic Balls

A NEW line of athletic balls featuring nylon winding, Butyl bladders, and Kolite covers is being marketed by Seamless Rubber Co., New Haven 3, Conn. The line consists of a basketball, model 580; football, model 581; and soccer ball, model 583. The Butyl bladder provides the necessary retention of air; while strength and resiliency are obtained with multiple layers of specially processed nylon applied on a "great circle" winding. This winding is said to be 500% stronger than that obtained with cotton thread.

The Kolite cover is claimed to be tougher than ordinary rubber and is also waterproof, scuff-proof, and highly abrasion resistant.

WE COVER THE WATERFRONT

LOTOL*
Compounded latices—ready to use

KRALAC*
Plastic latices

NITREX
Butadiene acrylonitrile copolymer latex

SHRINK-MASTER
Process for rendering woolens shrink resistant and long wearing

LATEX
Natural and synthetic

KANDAR*
Permanent finish for textiles

KOLOC*
Cationic resin compositions for cotton, rayon, and wool

NAUGATEX*
Dispersed chemical compounding ingredients for all latices

KRALASTIC
Flexible plastic latices

DISPERSITE*
Aqueous dispersion of rubber, reclaimed rubber, or resins

•

A COMPLETE LINE OF WATER-BASED LATEX MATERIALS

*Reg. U. S. Pat. Off.

NITREX

Butadiene Acrylonitrile Copolymers in Latex Form

Unsurpassed as a Coating or Saturant for Paper, Textiles, or other fibrous materials.

- **Oil resistant**
- **Better physicals**
- **May be embossed**
- **High adhesion to cellular base materials**

Various types tailored to your exact colloidal requirements

NAUGATUCK CHEMICAL

Division of United States Rubber Company

"Headquarters for Latex, Lotols and Dispersites"

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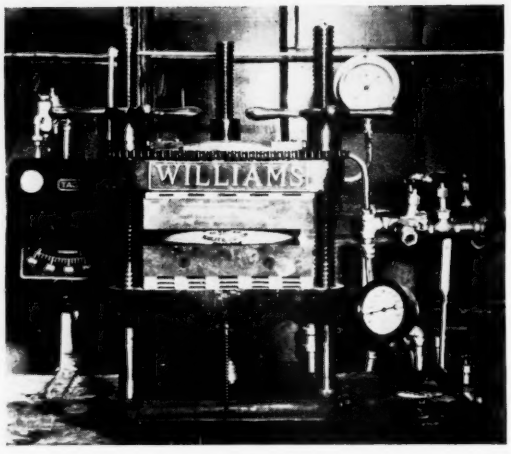


New Seamless Basketball with Nylon Winding, Butyl Bladder, and Kolite Cover Undergoes Compression Tests

while retaining the pebble texture of leather. In addition, the Kolite cover will not peel or crack and is unaffected by oil or grease. The combination of these features, together with the company's all-rubber patented Kantleek valve molded into the bladder, gives a product said to be far superior to any previously made by Seamless.

Certified tests on the basketball made with a five-inch ram press showed that the ball returns to original shape and size after compression under a pressure of 16,890 pounds, and that a pressure of 29,600 pounds is required to burst the ball. In another test the basketball supported the dead weight of a 10-ton truck and, when removed, returned to its original shape without breaking, tearing, or loss of air.

Test Abrasion Resistance
Taber
ABRASER Model 140
New instrument to test wear resistance of fabrics, protective coatings, plating, plastics, rubber, etc.
Incorporates proven rotary rub-wear action of dual abrading wheels, simulating wear under actual service conditions.
Write for new literature.
TABER INSTRUMENT CORP.
163 Goundry Street
North Tonawanda, N. Y.

Polyethylene Insulating and Splicing Tape

Polyethylene Tape

BAKELITE polyethylene resins are used in a new insulating and slicing tape manufactured by Bishop Mfg. Corp., New York, N. Y. Layers of the tape weld into a continuous elastic skin within a few minutes after being wrapped around a cable splice, tool handle, etc., and, when cut away, can be removed in one solid, homogeneous mass. The plastic base keeps the self-bonding tape flexible in severe weather conditions, and the tape is unaffected by temperatures ranging from 120° to —30° F., it is also claimed.

The new tape gives a seal that requires no adhesive material and is positive, permanent, moistureproof, and airtight. The tape and its seal are unaffected by corrosive fumes, ozone, sunlight, or oxygen. For application, the tape is stretched to two or three times its normal length, then wrapped normally. Once applied, it is almost impossible to unwrap or delaminate. Supplied in both clear and black forms, the tape is extremely useful for insulation and harness wrapping of all types.

Footwear Factories for Pakistan

The Government of East Pakistan has reportedly granted licences to four companies, one a Czechoslovakian firm, to establish footwear factories in the province. East Pakistan could use 4,500,000 pairs of rubber and canvas shoes a year, and the four companies are expected to produce 5,000,000 pairs annually.

RUBBING, SCRUBBING, SOAKING...

WON'T TAKE PARAPLEX OUT OF THE VINYL DRIVER'S-SEAT

In trucks, busses, automobiles, station wagons and tractors, vinyl seats take a beating. But the plasticizer —if it's one of the PARAPLEX resins—*won't come out for the life of the vehicle!*

These polymeric plasticizers (PARAPLEX G-25, G-40, G-50, and G-60) resist extraction by oil, gasoline, soapy water, and the endless rubbing of fabrics—withstand exposure to heat and ultra-violet light, too. They're a *permanent* part of vinyl upholstery, table covers, shower curtains, hose, and dolls.

SEND FOR LITERATURE AND SAMPLE

Tell us what your vinyl product must withstand, and we'll send you recommendations, appropriate literature, plus a sample of the PARAPLEX you need.

Write Department IRV-3.

PARAPLEX *is a trade-mark, Reg. U.S. Pat. Off. and in principal foreign countries.*

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

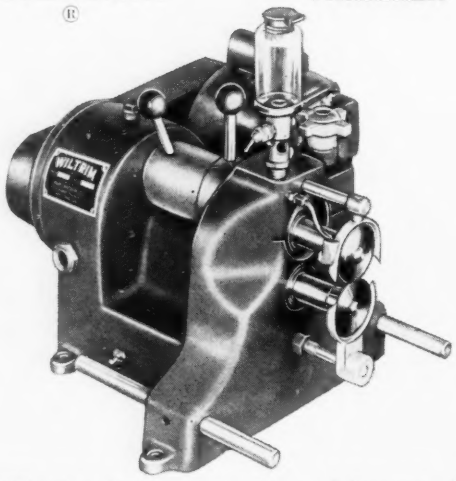
THE RESINOUS PRODUCTS DIVISION

Washington Square Philadelphia 5, Pa.

The Resinous Products Division was formerly The Resinous Products & Chemical Company

WILTRIM ®

Model DF TRIMMER



Wills thirty-five years experience brings you this outstanding successor to the famous earlier Models D, DE, and DM trimmers.

MACHINES ARE AVAILABLE FOR FREE TRIAL

FERRY MACHINE COMPANY

WILLS RUBBER TRIMMING DIVISION

KENT, OHIO, U.S.A.

(Export Sales Through Binney & Smith, International)

Eagle-Picher pigments

serve the rubber industry across the board

Eagle-Picher manufactures a comprehensive line of both lead and zinc pigments for the rubber industry. The quality and uniformity of our pigments, exact quality control methods of manufacturing, more than a century of experience... are the factors that make Eagle-Picher *serve you better.*

Zinc Oxides • Basic White Lead Silicate
Basic Carbonate of White Lead
Sublimed White Lead
Litharge • Sublimed Litharge
Red Lead (95%, 97%, 98%)
Sublimed Blue Lead

On the Pacific Coast:
Associated Lead & Zinc Co.
2700 16th Avenue, S. W.
Harbor Island, Seattle 4, Washington

EAGLE PICHER

THE EAGLE-PICHER COMPANY
Since 1843
GENERAL OFFICES: CINCINNATI (1), OHIO

EUROPE

GERMANY

Rubber and Plastics at Hannover Technical Fair

The German rubber and plastics industries were well represented at the Hannover Technical Fair held in May, and their exhibits were proof, if any were needed, that the industries are straining every nerve to make up whatever ground they lost during and immediately after the war.

The important tire manufacturers came out with their latest developments. Continental Gummiwerke A.G. showed its new heavy-duty steel cord tires, also the S.K.S. tire with S-patterned tread of special compound, and sloping rib profile, said to give improved adhesion on wet surfaces; finally an inner tube claimed to be proof against blow outs. In the inside of this tube, which is olive green in color, are arranged several layers of sticky, but tough compounds of different qualities; when a foreign object pierces the tube, air pressure causes the sticky mass to press up against the hole and thus prevent loss of air.

Harburger Gummiwarenfabrik Phoenix A.G. displayed a tire for field tractors in which the outstanding features are the wide, grooved, mid-section of the tread surface flanked by projecting edges, and with deep, wide recesses on both sides. The company presented a new vulcanizer for repairing and endlessly vulcanizing conveyer belts for the mining industry, which it has produced in cooperation with Maschinenfabrik Wagener & Co.

A wide range of tires for various purposes was also shown by Englebert & Co. (German branch), Gummiwerk Fulda, and Vorwerk & Co. A large assortment of mechanical, sporting, surgical, and latex goods, also toys and balls, was to be seen at the various stands of the many manufacturers of general rubber goods. Frank Clouth Rheinische Gummiwarenfabrik had on view, among other articles, conveyer belts with the so-called Dura edge of a fiberless, polyamid containing plastic material.

In the plastics section, one was struck by the displays of the great number of manufacturers of plastic articles. The biggest group seemed to consist of the firms making general molded and injection molded articles. Another large group of manufacturers included those utilizing P.V.C., and recently also polythene, for insulating wires and cables. These two plastics are being used on an increasing scale for a number of purposes; several firms are now making polythene film wrapping material; there were in addition extrusions and injection molded and welded polythene products.

Among the applications of polyamid may be mentioned braiding on Perbunan hose, by Technochemie Kessler, who also employs the material spirally around flexible P.V.C. vacuum-cleaner hose reinforced on the inside by a wire coil. Frank Clouth also makes hose braided with polyamid.

Leading manufacturers of machinery and measuring and testing devices for the rubber and plastics industries were also well represented. Among the newer developments were noted a flame-spraying device for plastic linings and coatings, by Griesheim-Autogen, and a high-frequency preheating device by F. W. R. Herfurth. This company recently cooperated with a sewing machine concern to produce a sewing-machine type of welder for joining plastic sheets which operates according to the "step by step" welding technique and not with rollers. Finally, there were infrared drying ovens by Werner & Pfleidered and by Schilde.

Vulcanized Rubber Powders in Asphalt Road Surfaces

The results obtained by Netherlands scientists in incorporating rubber powder from latex in asphalt for road surfaces have spurred German investigations on the substitution of finely ground vulcanized rubber for the Mealorub and Pulvatex generally used.

In a recent issue of "Bitumen, Teere, Asphalt, Peche and Verwandte Stoffe,"[1] Herbert Gunther discusses this work. The initial experiments, based on the work with latex powder reported by van Rooyen of the Rubber Stichting, Delft, before the war, immediately yielded very good results, he says; there was a reduction in penetration, and melting point of the asphalt/latex mix was higher. Further studies were then initiated to determine the effect of the chemical composition of the rubber meal (that is, the kind of rubber, natural or synthetic, and the rubber and carbon black content), also the effect of the fineness of the

[1] June 6, 1950, p. 168.

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powder and the method of comminution, and finally the effect of the heating time and temperature. The synthetic rubbers employed included German Buna S, GR-S, and Polysar S; experiments on other types as Hycar, neoprene, and Butyl are still in progress and are to be reported on later.

Besides powder from compounded rubber, powder from pure natural and synthetic rubbers and from a blend of the two (containing 5% to 25% synthetic rubber) was tested. Results seem to indicate that a high carbon black, tread-type compound is best for the purpose envisaged, and that about 10% of the powder should be added to the asphalt. Of the pure rubber powders, that obtained from a blend of natural and synthetic rubber had advantages over both the pure natural and the pure synthetic rubbers alone, when added to the asphalt in the proportion of 10%. But with high doses, up to 30%, pure synthetic rubber gave excellent results; whether it would be feasible to use such large amounts of rubber in road surfaces would have to be determined by costs.

For best results Dr. Gunther found that the powder should be as fine as possible; it should be sifted and should be produced in a toothed-rim or similar mill, in preference to a grinding mill.

The effect of heating time and temperature, when powders from vulcanized rubber are employed, was in all cases less marked than found by von Rooyen in his experiments with latex powder. He is quoted as having described a kind of "phase reversion" that took place when asphalt containing 10% of latex powder was heated for prolonged periods at elevated temperatures, wherein asphalt becomes the disperse phase instead of the rubber. The change did not occur when the proportion of rubber was kept at 5%. In the German tests with powder from vulcanized rubber such a reversion phase does not occur, or at least not readily, even when large doses of rubber are added to the asphalt, it is claimed. When the powder is made from a mix containing both carbon black and a certain percentage of Buna, more prolonged heating at higher temperatures results in a steady rise in the melting point, reduction in penetration and improvement in homogeneity of the asphalt-rubber mix.

The Achema IX

After an interval of 13 years the Dechema, German Society for Chemical Apparatus, was able to resume the Achema exhibition of chemical apparatus and convention. Advance notices appearing in a special, attractive brochure issued by the Dechema, and also in the press, promised that this ninth and biggest Achema would be memorable. At least 450 exhibitors had rented space, thus breaking the record set by Achema VIII in 1937, and some 60 papers covering the whole field of chemical apparatus were to be presented by specialists. There was also to be a separate six-day course of lectures offered to visiting professors and students, both German and foreign. The Dechema undertook to provide free quarters, breakfast and lunch to students, who would also have free admittance to the exhibition.

This year's Achema, held July 9-16, had eight halls in the Exhibition and Fair Grounds at Frankfurt a.M., including besides reception hall, convention hall for an audience of roughly 3,000, and an auxiliary lecture room, five exhibition halls covering approximately 24,000 square meters. In these rooms laboratory equipment, measuring and controlling instruments, apparatus and machinery, construction materials for chemical apparatus (rubber and plastics among the rest) were shown. In Hall V housing laboratory equipment, three new Hoppler developments were on view in addition to the already known Hoppler viscosimeter and Hoppler Konsistometer—namely, a Rheo-Viskosimeter, a Mikro-plastimeter, and an Ultra Thermostat.

Although many huge machines and apparatus were exhibited in Hall VII, it is noted that the general trend seems to be toward smaller machinery and plant rendered very efficient by high-speed electromotors and precision gears. The saving in time, and in some cases of equipment too, seems to be particularly significant in the new colloid mills, emulsifiers, extractors, and separators. Equipment for high vacuum processes, infrared drying, and spray drying were among other featured devices.

Of the numerous papers scheduled to be read, mention may be made of the following: "Fine and High Vacuum Processes in Chemistry," R. Jaeckel; "Rheological Measuring Processes in Industry, with Special Reference to Polyamid Resins," F. Hoppler; "New Device for Determining the Cold Break Temperature of Sheets and Plates of Plastic Materials," K. Mehnert; "Further Developments in Dispersion Techniques and the Ultra-Turrax High Capacity Disperser," Prof. Willems; "New Developments in the Field of Elastic Packings for Movable Machine Parts," E. Hosang; "Properties and Applications of Polyethylene-Containing Plastics," H. J. Saechtling; "New Welding Methods for Thermoplastic Materials," R. Steinmann; "Drying Fabrics, Lacquers, and Printing Inks by Irradiation," H. Gunther.

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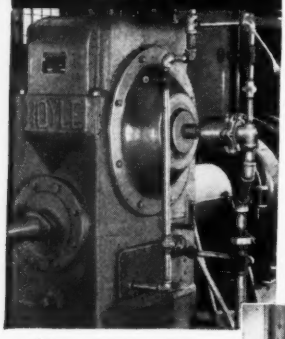

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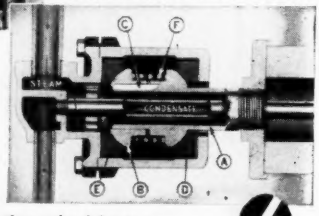

Johnson Joint installed on rubber extruder. Photo courtesy of Manhattan Rubber Div., Raybestos-Manhattan, Inc.

Rotating member consists of Nipple (A) and Collar (B), keyed together (C). Seal ring (D) and bearing ring (E) are of self-lubricating carbon graphite. Spring (F) is for initial seating only; joint is pressure sealed in operation.

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MALAYA

Production and Shipments of Rubber

Malaya's rubber production declined from 696,978 tons in 1948 to 670,257 tons in 1949; the 1947 total was 645,229 tons. The 1949 reduction was largely due to lower output from smallholdings; the totals were 270,248 tons in 1949, against 294,071 tons in 1948. Outputs from large estates showed only a small difference, from 402,907 tons in 1948 to 400,009 tons in 1949.

Rubber shipments from Malaya (including foreign rubber) also declined, from 979,107 tons in 1948 to 899,212 tons in 1949. Last year Malayan shipments included 265,328 tons to the United States (against 371,391 tons in 1948), 146,362 tons to the United Kingdom (against 173,094 tons), 63,414 tons to Russia (against 103,593 tons), 57,391 tons to France, and 56,738 tons to Germany.

Local rubber manufacturers consumed 4,500 tons of rubber during 1949, and if the monthly figures for October and December, at 539 and 537, respectively, may be considered indications of a sustained trend, consumption during the current year should be well over 6,000 tons.

An increase in the production of crude rubber in Malaya during 1950 is looked for in some quarters. E. Jago, of the British Rubber Development Board, reportedly expects a record output of 700,000 tons this year, a figure that may well be reached if the price rise following devaluation can be maintained and expectations of increased consumption in new fields, as rubber powder for roads, are realized. In any case it may be mentioned that an immediate effect of the better prices obtainable in the last months of 1949 was the greater amount of tapping by smallholders; as the production totals for 1949 showed, the decline in that year was for the most part caused by the lower outputs from smallholdings over the greater part of the year.

Rubber production in the first half of 1950 amounted to 321,781 tons, against 324,794 tons for the same period of 1949; smallholder rubber accounted for 142,725 tons in the 1950 period, against 132,555 tons in 1949, and estates for 179,056 and 192,239 tons respectively. Output included 32,710 tons of prepared latex, 5,091 tons of special rubbers (63 tons chemically modified rubber, 600 tons softened rubber, and 4,428 tons prepared according to patented or technically specified processes), and 34,511 tons of remilled rubber.

Exports of Malayan rubber in the first half of 1950 totaled 457,502 tons, against 449,272 tons in the corresponding period of 1949.

The new price levels of rubber have stimulated forward sales. Press notices regarding some 20 companies in Malaya show that during July and August they sold forward about 2,500 tons out of 1951 crop at prices ranging all the way from just under 1s. 3d. a pound to 2s. 10d. a pound; most of the contracts seemed to have been closed at prices averaging between 1s. 9d. and 2s. a pound. The highest prices were obtained for January-March, 1951, deliveries. One company sold 75 tons out of 1951-52 crop at 16 3/8d. a pound. Brokers in Singapore reported a few months ago that 40% of the 1950 crop had already been sold.

Rubber to Russia

Since the outbreak of the Korean war, the logic of selling rubber to Russia has been a question for debate among local producers and dealers of rubber, and the preemptive buying of Malayan rubber by Britain and the United States has been more or less tentatively discussed. Recently the *Malaya Tribune*, a Chinese owned daily, has come out boldly in favor of the latter policy in a leader also urging the denial of rubber to Russia.

Shipments of Malayan rubber to Russia during the first half of 1950 came to 34,662 tons; it is estimated that 40,000 tons of rubber had been sold directly to the Soviet within a period of two months this past summer. Czechoslovakia, which had bought only 1,997 tons of rubber in the first six months of 1950, had stepped up her purchases to 200 tons daily in July. In addition it is reported that brokers suspect that at least a considerable portion of the rubber of late bought for shipment to Hong Kong, Tientsin, and Bombay, has been diverted to North Korea and Russia.

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Centralized Processing of Native Rubber

In Communication 268 of the Rubber Research Scheme of Malaya, Davidson and Rouse discuss the experiment being carried out at Merbok, Kedah, with "Centralized Processing of Smallholders' Latex and Rubber." The R.R.I. Smallholders' Advisory Service has for many years been attempting to improve the product of the smallholder by providing information and advice, but the results obtained did not repay the continued efforts needed to help the natives maintain proper standards. This state of affairs led the R.R.I. to investigate different methods, and it hit upon the plan of centralized processing of native rubber in small, inexpensive factories operated, where possible, by the growers themselves, but managed by technically trained natives. The first trial along these lines was started in 1948 in the Merbok district of Kedah, and by March, 1949, a small, simply equipped factory was processing the latex collected from 109 small holdings with a combined area of 313 acres. It was found possible to turn out a fair proportion of first-quality sheet, and figures for the period March-December, 1949, inclusive, indicated that an operator could make a reasonable profit if he produced No. 1 sheet.

Notes on the Malayan Rubber Industry

To encourage the use of rubber tires and thus save road surfaces, Johore has announced a drastic cut in licence fees for bullock carts fitted with rubber tires; carts so equipped will pay only $12 (Straits currency), against $36 a year for carts with metal tires.

An item in a local paper stated that Henry Nicholas Ridley had celebrated his ninety-fourth birthday in his home at Kew, London, on December 10, 1949. Mr. Ridley is the man who came to Singapore as assistant director of Botanic Gardens in 1888 and discovered how to tap the *Hevea* tree without killing it, thus making possible the development of the vast rubber plantation industry. As civil servant, Mr. Ridley could not profit by the rubber boom which followed the turn of the century, we are told; however, his services did not go unrecognized. In 1911 he was made a C.M.G.; later he became a Fellow of the Royal Society and Linnean Society, and in 1928 he received an American medal for his service in establishing *Hevea* in the Far East.

Malayan-made rubber footwear seems to be finding a growing market in Australia. During 1949, 23,823 dozen pairs of rubber boots, shoes, and sandals, valued at $362,330 (Straits currency), were sold to this dominion. It is reported that rubber footwear is now also being shipped to Australia by air, and that from now on it is expected to send about 1,500 pairs a month in this way.

Dunlop Malayan Estates, Ltd., has opened a new rubber research center near Batang Malaka, Negri Sembilan. Investigation at this center, said to be one of the best equipped in the Far East, will be devoted to matters relating to latex production and to methods of developing the natural rubber industry to meet competition from synthetic rubber. The work will be coordinated with research in the United Kingdom.

SEE PAGE 4

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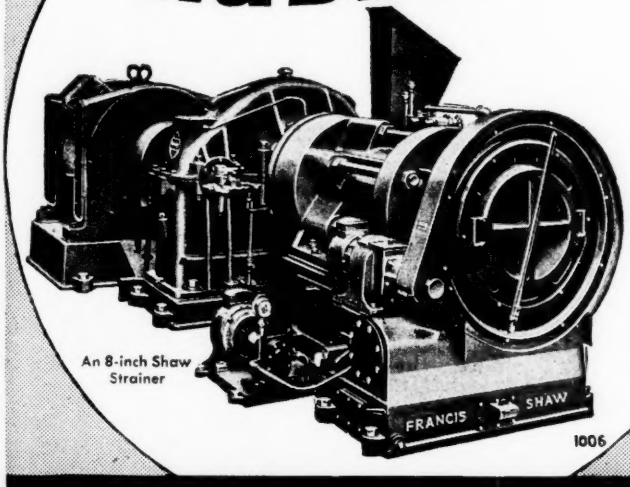

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To date the situation with regard to the suppression of banditry in Malaya may be described as still obscure. But a more alarming turn in bandit activity seems to have been taken since the Korean war began. Before that Singapore had been singularly free from terrorist attentions, but news came on July 27 that bandits had set fire to the Aik Hoe plant, completely destroying it and with it about 4,500 tons of rubber. The factory was the second largest remilling plant in Singapore, and the singular circumstances about the case are that within ten days three attempts had been made to burn the factory, with the third try successful, and furthermore that captured plans of the Malayan Communist Party had listed the plant for sabotage.

INDIA

Data published in Serial Pamphlet No. 3, of the Indian Rubber Board, reveal that at the end of September, 1949, there were 13,571 rubber estates, with a total area of 166,937.6 acres in South India. Indian estates on the whole are quite small. Only 249 estates out of the large number registered have an area of 100 acres or more, and these cover altogether only 101,058 acres. At the other end of the scale, we find 2,328 holdings with a combined area of only 1,330 acres. But the greater number of Indian holdings run from one acre to under 10 acres in extent; last year no fewer than 9,533 of these had a combined area of 27,262 acres, giving an average of less than three acres per holding.

In the third quarter of 1949 the total output of rubber was 3,559 tons, including 152 tons latex and 101 tons sole crepe. In the same period local rubber manufacturers used 5,242 tons of rubber, including 120 tons of latex; local consumption, therefore, is considerably ahead of local production of crude rubber.

Rubber planting in India labors under the handicaps of comparatively poor soil and a marked rainy season during which rainfall is continuous, and an equally marked dry season. As a result of these and other conditions, rubber trees in India become tappable three to four years later than in Malaya.

No yield figures are given, but it is known that output per acre is on the low side. There is a certain amount of interest in clonal seed and buddings, and individual estates have made use of these new materials, with a tendency to favor buddings.

Unlike his opposite in Malaya, even the smallest rubber grower in India sells his rubber in the form of smoked sheets, though the smoking may have to be carried out in the kitchen. Many smallholders sell their latex to central latex collecting plants, of which there were eight in 1948. These factors, remarks the publication quoted, to some extent explain why a higher proportion of Indian raw rubber comes under top grades than of Malayan rubber.

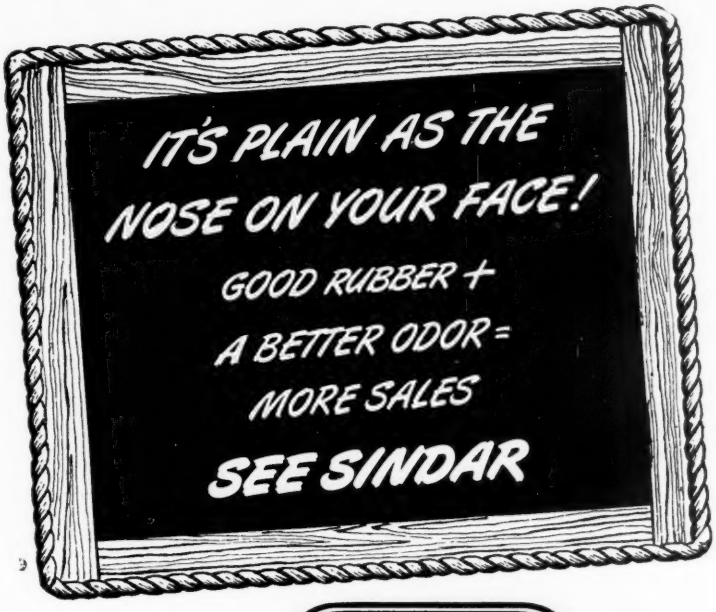
Monsanto Chemicals of India, Ltd., Bombay, has been formed with the immediate purpose of establishing a selling organization in India. It is planned eventually also to manufacture products for which there is a ready market here and for which it is possible to obtain local materials. The directors of the new enterprise include W. M. Rand, president, Monsanto Chemical Co.; E. O. O'Neal, Jr., chairman, Monsanto Chemicals, Ltd.; A. E. Blair; W. E. Daysh; B. K. Denton; J. W. Urban; and M. E. Young.

MADAGASCAR

In the past small areas of *Hevea* were planted in Madagascar —the earliest about 40 years ago—tapped from time to time when prices were sufficiently tempting, and then abandoned. A recent note[1] states that the rubber is found in the northwestern part of the island and includes plantings said to be among the first started here, besides areas 30-35 years old, all interspersed with self-sown seedlings. Although quite uncared for, the trees are said to make a very favorable impression, being robust and healthy; while under similar circumstances in the Far East they would have been killed off some time ago.

The article adds that about 10,000 hectares in the Sambirano Valley and 2,000 hectares in the more elevated Nossi-Be region would be suitable for planting *Hevea* and that labor is comparatively abundant and cheap, but there does not at present seem to be enough information available to give an idea of the yields and quality of the rubber obtainable from the *Hevea* here.

[1] *Rev. gén. caoutchouc*, 27, 1, 6 (1950).



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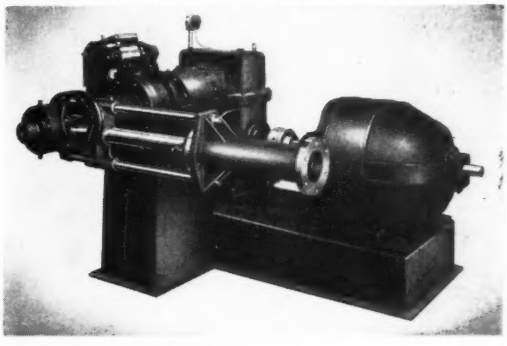

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Editor's Book Table

BOOK REVIEWS

"The Organization of Industrial Scientific Research." C. E. Kenneth Mees and John A. Leermakers. Second Edition. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 392 pages. Price, $5.

This book provides a complete exposition of all the steps in the organization and operation of an industrial research laboratory and discusses problems associated with research departments. The first section deals with the nature of industrial research and its effect on the economy; while the second section describes the set-up of such agencies as government laboratories, research associations, technological research institutes, and industrial laboratories.

The third and largest section of the book provides detailed and authoritative information on the position of the laboratory in a company; internal organization of the laboratory; the laboratory director and scientific staff; selection of the laboratory program; the direction of research; the transfer of research to production; reports, patents, publications, and library; financial administration of the laboratory; laboratory personnel; salary administration; supplies and services; the design of a laboratory for a specific industry; and the design of the laboratory building. As a result, the book will be of great value to the laboratory executive and to industrialists who wish to know how research and development can be properly managed.

"Cellulose Plastics." D. N. Buttrey. Cleaver-Hume Press, Ltd., London, England. Interscience Publishers, Inc., 250 Fifth Ave., New York, N. Y. Cloth, 4-¾ by 7¼ inches, 127 pages. Price, $2.10.

This monograph is designed to give the chemist unfamiliar with cellulose and its derivatives an idea of the manufacture of cellulose plastics and the principles underlying their more important properties. As such, details on the practical molding and fabrication of cellulosics are omitted, and emphasis is placed on the theoretical considerations involved in the manufacture and properties of cellulose plastics.

The first chapter, on the occurrence of cellulose, covers wood cellulose; the sulfite, soda, and sulfate processes; cotton; structure of cotton hairs; bast fibers; and other sources of cellulose. The second chapter discusses the constitution of cellulose, including molecular weight and structure. The concluding three chapters are devoted to discussions of cellulose nitrate, cellulose organic esters, and cellulose ethers, and cover sources, manufacturing processes, reactions, processing, and applications. Tables, graphs, and literature references are used throughout the book, and a bibliography and author and subject indices are also included.

"Fabric Reinforced Plastics." W. J. Brown. Cleaver-Hume Press, Ltd., London, England. Interscience Publishers, Inc., 250 Fifth Ave., New York, N. Y. Cloth, 4-¾ by 7¼ inches, 148 pages. Price, $2.10.

Relatively little has been published on the subject of fabric reinforced plastics; so this monograph should find ready acceptance not only for its coverage of the field, but as a stimulus for further research. The author has not only assembled existing information on these plastics, but has endeavored to explain the probable mechanism whereby fabrics can cause reinforcement of a plastic. Much original matter is presented, and there are extensive literature references, charts, tables, and drawings to clarify the text.

The monograph comprises seven chapters including an introduction. Topics covered are raw materials, including resins, fibers, and textiles; manufacturing process, including fabric impregnating, laminating, molding, forming, fabricating, cementing, and heating; physical properties, wth tables of data; factors influencing physical characteristics; applications; and methods of testing. An appendix on British specifications for fabric reinforced plastics is also given, and author and subject indices are included.

"Summary of the Report of the Director of Research, 1949." Geoffrey Gee. British Rubber Producers' Research Association, Inc., 19 Fenchurch St., London E.C.3, England. 12 pages. This report discusses the objectives of the Association's laboratory work and lists and describes the main research and development projects conducted in 1949 and 1950.

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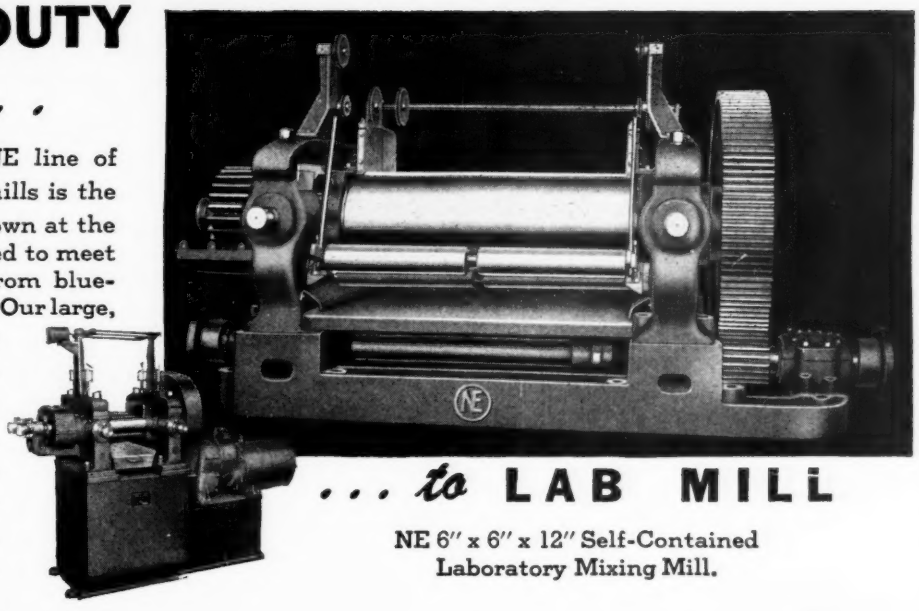

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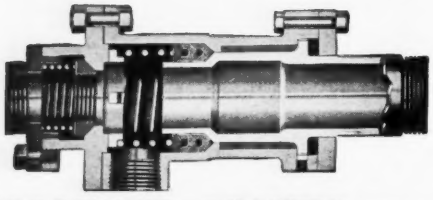

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NEW PUBLICATIONS

"Marbon Ty-Ply, the Rubber to Metal Vulcanizing Adhesive." Marbon Corp., Gary, Ind. 24 pages. This booklet describes the different types of Ty-Ply and gives information on their handling and use and detailed data on the adhesion to steel of both black and non-black natural and synthetic rubber stocks using these adhesives.

"Di-tert-Butyl-para-Cresol (DBPC)." Technical Bulletin C-O-115, June, 1950. Koppers Co., Inc., Pittsburgh 19, Pa. 13 pages. A revision and expansion of a preceding bulletin, this report presents extensive technical and commercial data on DBPC, a material recommended for use as a rubber antioxidant and vinyl stabilizer. Subjects covered include properties, chemical reactions, and applications.

"A Reference Guide to Dow Corning Silicone Products." Dow Corning Corp., Midland, Mich. 4 pages. This publication is a handy reference covering the properties, handling, and applications of the company's silicone products, including fluids, compounds, greases, resins and varnishes, Silastics, and chemicals.

"Research Facilities without Capital Investment." Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y. 20 pages. The function of a chemical consultant in industrial research is discussed in this booklet, with emphasis on the importance of the consultant's equipment and personnel, and the results to be expected in various types of problems.

"Bakelite Polyethylene." Bakelite Division, Union Carbide & Carbon Corp., 300 Madison Ave., New York 17, N. Y. 24 pages. This illustrated booklet describes the company's polyethylene resins, gives information on their properties, available forms, and methods of fabrication, and illustrates typical applications.

"Extruded Plastics." Anchor Plastics Co., Inc., New York, N. Y. 8 pages. Written from the standpoint of application, this booklet illustrates and describes extruded components made by the company for a wide variety of industrial and consumer products. A table showing the properties of thermoplastics is also included.

"Arcco Tackifier Resin Emulsions for Natural and Neoprene Rubber Latices." Technical Data Sheet No. A39. American Resinous Chemicals Corp., 103 Foster St., Peabody, Mass. 3 pages. This report offers information on the properties and uses of the company's three natural latex and two neoprene latex tackifiers and discusses the compounding and handling of tackifier-latex adhesives.

"Baker Plasticizers for Polyvinyl Chloride-Type Resins." Technical Bulletin #24. Baker Castor Oil Co., New York, N. Y. 7 pages. This bulletin describes the firm's different series of vinyl plasticizers and suggests formulations for their use in calendered film, plastisols, spread coatings, and slush moldings.

"Armstrong's Adhesive." Armstrong Products Co., Warsaw, Ind. 2 pages. This bulletin describes the four grades of adhesive available, all combinations of thermo-setting resins and inorganic fillers, and presents information on their properties and uses.

"Coatings from 'Thiokol' Liquid Polymer." Thiokol Corp., Trenton, N. J. 4 pages. The physical properties of two rubber-like coatings based on "Thiokol" LP-2 are given, together with information on their solvent and chemical resistance, formulation, preparation, application, and handling.

"B. F. Goodrich Plastikon Rubber Putty." B. F. Goodrich Co., Akron, O. 2 pages. This catalog section describes the advantages of Plastikon for many types of glazing and sealing under conditions of vibration, corrosion, or moisture; gives directions for use; and lists stock colors and grades.

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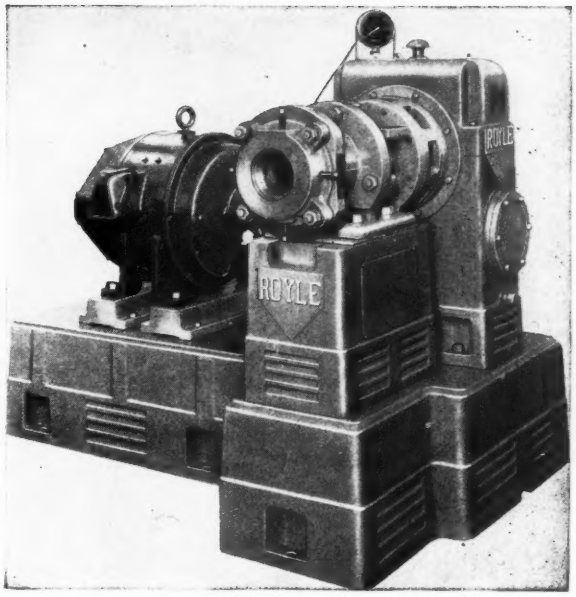

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"Rubber for the Absorption of Vibration." J. F. Downie Smith. Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa. Engineering Report No. 2. 50 pages. This report reprints five papers by Dr. Smith and one paper hitherto unpublished. These papers are: "Rubber Mountings"; "Rubber Springs—Shear Loading"; "Rubber Springs under Compression Loading"; "Research on Rubber for Mechanical Engineers"; "Rubber Springs—Shear Loading II"; and "The Design of Rubber Mountings."

"A.S.T.M. Standards on Plastics." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. June, 1950. 626 pages. Price $4.85. This fifth edition of standards, sponsored by the Society's Committee D-20, presents in convenient form some 120 specifications and test methods covering a wide range of plastics and related materials. In addition, there are 11 recommended practices covering such topics as definitions of terms, nomenclature, etc.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **"Compression Set of Neoprene Type W—Effect of Sulfur."** BL-237, August 31, 1950. 4 pages. Data show that sulfur severely impairs the resistance of Type W vulcanizates to compression set, particularly at high temperatures. Use of NA-22 or Permalux without sulfur is recommended for stocks requiring minimum set at all temperatures.

"Neoprene Notebook." No. 46, August, 1950. 8 pages. This issue contains the concluding section of an article on dynamic properties of neoprene vulcanizates and also includes stories on a neoprene pinch valve, neoprene-cork push-out segments for dinking dies, neoprene shock absorbers for power driven fasteners, and others.

"The RPAs." Report No. 50-5, July, 1950. C. J. Mighton. 24 pages. This report is a detailed review of the properties of RPA Nos. 2, 3, and 5, and covers their use in natural rubber and GR-S under varying conditions and different types of equipment.

"Silastic Facts." No. 10, September, 1950. Dow Corning Corp., Midland, Mich. 16 pages. Typical applications of Silastic gaskets, seals, diaphragms, hose, and mechanical parts are described and illustrated. Also given are extensive data and discussions of the physical, chemical, thermal, and electrical properties of Silastic.

"Vinsol Resin in Buna N Adhesives." Hercules Powder Co., Wilmington, Del. 12 pages. Properties and available forms of Vinsol resin are presented together with discussion of its use in Buna N cements. Topics covered include cement preparation, cement application, variables affecting the bond, etc. A brief discussion of Vinsol emulsion for Buna N latex adhesives is also included.

"Baker Castor Oils, Castungs, Castor Oil Derivatives." Baker Castor Oil Co., New York, N. Y. 4 pages. This bulletin tabulates the company's products by types and offers information on their chemical nature, product and brand names, typical properties, and suggested applications.

"Properties of Flammable Liquids, Gases, and Solids." Loss Prevention Bulletin No. 36.10. Factory Mutual Engineering Division, 184 High St., Boston 10, Mass. This booklet features a table of more than 650 flammable materials found in industrial plants, and gives their chemical formulae, flash points, explosive limits, auto-ignition temperatures, specific gravity, and other data.

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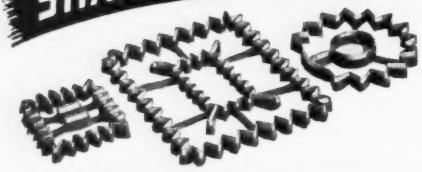

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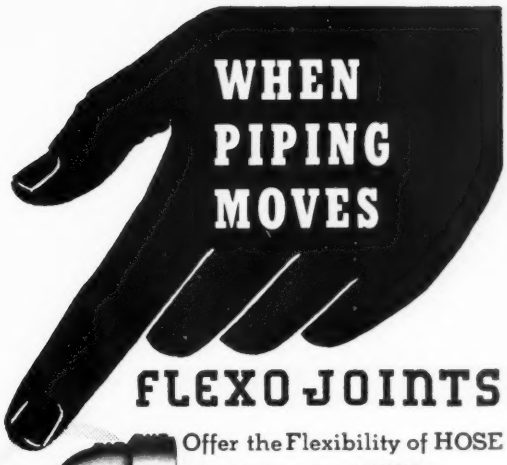

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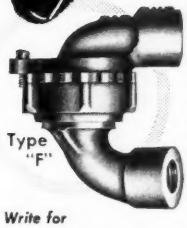

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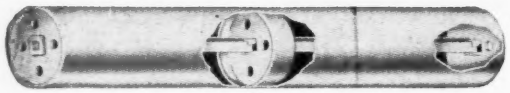
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(Classified Advertisements Continued on page 113)

Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	July 29	Aug. 19	Aug. 26	Sept. 2	Sept. 9	Sept. 16
Futures						
Nov.	40.32	40.30	46.37	45.67	49.37	53.77
Jan.	36.24	38.95	45.00	44.01	47.94	52.34
Mar.	34.70	37.75	43.00	42.25	46.60	51.00
May	32.70	35.70	41.00	40.25	44.60	49.00
July	31.90	34.90	40.20	39.45	43.80	48.20
Sept.	31.10	34.10	39.40	38.65	43.00	47.40
Total weekly sales, tons	9,820	4,730	1,920	3,070	2,040	5,220

RUBBER futures prices underwent a wide range of fluctuation on the New York Commodity Exchange during the period from August 16 to September 15. Prices rose at the beginning of the period, reflecting the strength of the physical markets, then fell off toward the end of August as traders awaited the forthcoming governmental control regulations. With the issuance of these regulations, prices again rose irregularly during the first half of September, following the lead of the physical markets.

Despite the fluctuating prices, speculative activity on the Exchange was at a minimum in view of the heavy margin requirements for transactions. This lack of speculation is reflected in the August monthly sales volume of 17,060 tons, as compared with 36,040 tons sold during July. Sales during the first half of September totaled only 7,370 tons.

November futures prices started at 39.80¢ on August 16, rose to a high of 48.22¢ on August 29, and fell off to 45.02¢ at the close of the month. On September 1 November futures were priced at 45.67¢, then rose irregularly to a high of 53.77¢ on September 15.

New York Outside Market

WEEK-END CLOSING PRICES

	July 29	Aug. 19	Aug. 26	Sept. 2	Sept. 9	Sept. 16
No. 1 R.S.S.						
Spot	50.00	47.50	54.00	50.50	54.00	58.50
Oct.	42.50	42.50	49.50	47.00	51.50	55.00
Nov.	40.50	41.50	48.50	46.00	50.50	54.50
Dec.	....	....	47.50	45.00	49.50	53.50
No. 3 R.S.S.	49.00	46.50	53.00	49.50	53.00	57.50
No. 2 Brown	42.00	42.50	46.50	45.00	48.00	52.00
Flat Bark	39.50	38.50	41.50	41.00	45.00	47.00

WIDE price fluctuations and strong buying interest featured the New York Outside Market during the period from August 16 to September 15. At the start of the period, prices rose strongly in view of large-scale buying by manufacturers endeavoring to build up their inventories before the imposition of government control. Government buying for the stockpile both in the domestic and foreign markets, coupled with labor unrest in Indonesia, gave further impetus to the advance, which slackened off toward the end of August as the industry awaited the new controls.

During the first half of September prices rose again in view of renewed government purchasing for the stockpile. It was also reported that stockpile purchases were being made in London with ECA counterpart funds, and all foreign physical markets displayed strong bullish tendencies as other countries made stockpile purchases. The announcement that all stand-by GR-S plants are being reactivated brought no immediate response on the market since it will be some months before the increased production of GR-S will make itself felt. There were some reports that the government will expand its stockpile purchasing to include all recognized grades of natural rubber, and this move should ease the pressure on top-quality sheets.

The announcement of a fourth-quarter export duty increase on Indonesian rubber also had no effect on the market. The rise from 36.6 to 61.4 Indonesian cents per kilogram of rubber will mean an increase of approximately 7¢ per pound, U. S. currency. The consensus of opinion in trade circles is that the present price of rubber is high enough for the Indonesian producer to absorb the tax and still realize a sufficiently high profit to maintain production levels. Rumors of this higher export duty have been current for some time, and it is believed that quantities of Indonesian rubber have been moved to the market to beat the tax. In general, the greatest effect of the new tax will be on the Indonesian exporters who will have to maintain competitive price levels with the Singapore market.

No. 1 sheets started the period at a spot price of 46.50¢, rose to 55.50¢ on August 24, fell to 50.50¢ on August 31 and September 1, and then rose to a high of 58.50¢ on September 15. Similar price movements were shown by the lower quality grades. No. 3 sheets went from 45.50¢ on August 16 to 54.50¢ on August 24, fell to 49.50¢ at the end of the month and then advanced during September to a high of 57.50¢ on September 15. No. 2 Brown started the period at 41.50¢ and, after fluctuating, reached a high of 52.00¢ on September 15. Flat Bark prices went from 37.50¢ on August 16 to close at 47.00¢ September 15.

Latices

THE 10,00-long ton *Hevea* latex stockpile objective of the forthcoming amendment to R-1 will probably be achieved in less time than originally expected, according to Arthur Nolan, writing in the September issue of *Natural Rubber News*. At present price levels of approximately 70¢ a pound, domestic consumption of *Hevea* latex is expected to decline from the present level of about 4,300 long tons a month. This decline, coupled with the steady increase in supplies, should result in a relatively rapid achievement of stockpile goals. *Hevea* latex stocks at the end of July were 4,753 long tons, dry weight; while July receipts totaled 4,041 long tons, and consumption was 3,626 long tons.

Adding to the prospects for early improvement in *Hevea* latex stocks were reports of forthcoming substantial imports from United States Rubber Co. plantations in Sumatra which were strike-bound from August 21 to early September, and the announcement by Dunlop Rubber Co. that it will sell limited quantities of latex directly to the Munitions Board for stockpiling. Dunlop had originally stated that it would cease selling latex in this country.

According to Mr. Nolan, it appears that the United States will receive the 50,000 tons of *Hevea* latex forecast for this year, since current high prices will serve as the necessary stimulus for production of the latex. World production of *Hevea* latex has been estimated at 66,000-80,000 long tons, and Mr. Nolan believes the higher figure to be more probable in view of prices and demand. Production of latex for 1951 has been estimated at from 100,000-120,000 long tons, with the United States share at from 60,000-75,000 long tons, but both production and consumption will be influenced by selling prices and usage controls.

GR-S latex production during August was 2,155 long tons, and the latex continues in short supply. While neoprene latex production figures are not available, this latex is also said to be in extremely short supply because of increased demand resulting from high natural latex prices.

SCRAP RUBBER

THE scrap rubber market was in an unsettled condition during the second half of August and the first half of September. The sharp increase in demand for scrap and rising prices during the first part of August resulted in a heavy outpouring of scrap. Consumers were glutted with supplies and, toward the end of August, imposed an embargo on further shipments that resulted in scrap prices falling off. Under the embargo, reclaimers did not accept carload shipments of scrap; while trailer loads required special permits that were difficult to obtain. It is expected that the reclaimers will work off their supplies by the end of September and again enter the buying picture.

On the export side, some foreign orders of scrap tubes were said to have been placed, but, in general, export business was confined to numerous inquiries. These inquiries were said to have come from Japan, China, and Spain, although there were no reports of actual contracts made for export.

Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$25.00	$25.00
Peelings, No. 1	60.00	60.00
3	35.00	35.00
	(¢ per lb.)	
Black inner tubes	8.00	8.00
Red passenger tubes	12.00	12.00

RECLAIMED RUBBER

THE reclaimed rubber industry continued to operate at top speed during the period from August 16 to September 15. Reclaim sales for August were about 15% higher than those for July, and sales during September are expected to increase by another 5%. Reclaiming plants are operating on a seven-day-week production schedule, yet are not meeting the demand. Several companies are reported to be using allocation systems based on usage of reclaim by the customer during the preceding six months, but even with these systems most reclaimers are not accepting orders from new customers. Reclaim prices were essentially unchanged during this period, but have shown more stability despite the

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Classified Advertisements Continued on Page 117

high demand and the fluctuating scrap rubber prices.

Final June and preliminary July statistics on the domestic reclaimed rubber industry are now available. June production totaled 25,869 long tons; imports, 91 long tons; consumption, 25,253 long tons; exports, 889 long tons; and month-end stocks, 28,470 long tons. Preliminary figures for July show a production of 24,367 long tons; consumptions, 22,307 long tons; exports, 900 long tons; and month-end stocks, 29,861 long tons. Reclaim figures for the first half of 1950 follow, in long tons: production, 136,336; imports, 302; consumption, 132,727; exports, 5,432; and stocks, 28,470.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	10.00/10.75
Peel	1.18-1.20	nom.
Inner tube		
Black	1.20-1.22	nom.
Red	1.20-1.22	nom.
GR-S	1.18-1.20	nom.
Butyl	1.16-1.18	nom.

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

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NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	July 29	Aug. 19	Aug. 26	Sept. 2	Sept. 9	Sept. 16
Dec.	38.78	38.04	38.16	39.52	41.05	41.11
Mar.	38.88	38.24	38.40	39.68	41.04	41.08
May	38.81	38.17	38.38	39.52	40.90	40.83
July	38.30	37.68	37.91	39.13	40.33	40.05
Oct.	35.30	34.75	35.15	36.28	35.96	35.57
Dec.	35.07	34.53	34.93	35.99	35.61	35.08

LOW crop estimates coupled with strong domestic and foreign demand sent raw cotton prices up to new high levels on the New York Cotton Exchange during the period from August 16 to September 15. The Korean conflict played an important part in the rising demand from mills, but even if this war ends soon, the mobilization program is expected to continue unabated. The steady rise in prices was featured by lively mill price fixing that absorbed hedges and realizing sales. The advance was concentrated in the current crop positions since the next crop is not expected to be limited by any acreage controls.

The Exchange reported that exports of cotton during August and the first half of September amounted to 621,264 bales, as compared with 269,578 bales during the same period last year. The government imposed export restrictions on raw cotton and cotton linters on September 9. Under these restrictions, licenses will be required for all exports of cotton and linters to all destinations except Canada and exclusive of shipments valued at less than $250 and destined for countries outside the Soviet bloc.

A total domestic supply of all cotton for the current season of 16,900,000 bales is indicated by most data; while the outlook for total distribution is estimated at from 14,000,000-15,500,000 bales. This condition would indicate a carry-over at the end of the season of only 1,400,000-2,900,000 bales.

The 15/16-inch middling spot price started at 38.45¢ on August 16, rose to a monthly high of 40.35¢ on August 30, and closed the month at 40.25¢. In September, the spot price began the month at 40.33¢ and rose to a high of 42.07¢ on September 15. Futures prices showed corresponding movement; December futures rose from 37.56¢ on August 16 to 39.42¢ on August 31 from 39.52¢ on September 1 to a high of 41.12¢ on September 15.

Fabrics

The boom in the industrial cotton fabrics market continued during the period, August 16 to September 15, with most mills withdrawn from the market after having sold most of their fourth-quarter production early in August. Another factor in the withdrawal from the market was the expectation of further fabric price advances as the result of rising raw cotton prices and a recent wage increase to employes.

All types of industrial fabrics, particularly ducks, are very much in demand because of the Korean conflict and the mobilization program. Although direct purchasing by the government has been light, usage by civilian concerns manufacturing military goods has increased greatly. Duck mills are beginning to convert to a three-shift working day, and this move, if completed soon, will ease the load on the market unless the mobilization program is greatly expanded. Duck mills have instituted a system of allocation of goods to their customers, and this system has worked quite well. An allocation system has also been initiated by many mills making drills, twills, sheetings, and other fabrics, and sales well into the first quarter of next year have been reported.

Cotton Fabrics

Drills		
59-inch 1.85-yd.	*yd.*	$0.45
2.25-yd.		.395
Ducks		
38-inch 1.84-yd. S. F.	*yd.*	nom.
2.00-yd. D. F.	*yd.*	nom.
51.5-inch, 1.35-yd. S. F.		nom.
Hose and belting		.73
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.325
3.65-yd.	*yd.*	.2025
Raincoat Fabrics		
Bombazine, 64x60 5.35-yd.	*yd.*	nom.
Print cloth, 38½ inch, 64x60		$0.23
Sheeting, 48-inch, 4.17-yd.		.22⅜
52-inch 3.85-yd.		.245
Chafer Fabrics		
14-oz./sq. yd. Pl.	*lb.*	.725/.75
11.65-oz/sq. yd. S.		.67 /.685
10-80-oz./sq. yd. S.		.71 /.725
8.9-oz./sq. yd. S.		.725/.735
Other Fabrics		
Headlining, 59-inch 1.35-yd 2-ply	*yd.*	.62
64-inch 1.25-yd. 2-ply		.65
Sateens, 53-inch 1.32-yd.		.635
58-inch 1.21-yd.		.695
Tire Cords		
K. P. std., 12-3-3	*lb.*	.785
12-4-2		.775

RAYON

PRODUCERS' shipments of rayon to domestic consumers during August totaled 110,500,000 pounds, an all-time monthly record. Shipments for the first eight months of the year amounted to 816,700,000 pounds, 42% greater than 1949 shipments for that period. Of the August total, filament yarn shipments were 82,800,000 pounds, of which 26,500,000 pounds were viscose high-tenacity (tire type) yarn. Producers' stocks at the end of August totaled 15,500,000 pounds of rayon.

No changes were made in rayon tire yarn and fabric prices during the period from August 16 to September 15.

Rayon Prices

Tire Yarns	
1100/ 480	$0.58
1100/ 490	.57
1150/ 490	.57
1650/ 720	.56/.57
1650/ 980	.56
1900/ 980	.56
2200/ 960	.56
2200/ 980	.55
4400/2934	.58
Tire Fabrics	
1100/490/2	.66
1650/980/2	.635/.67
2200/980/2	.625

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, July, June, 1950; First Seven Months, 1950, 1949

	July, 1950	% of Change from Preceding Month	June, 1950	First Seven Months, 1950	First Seven Months, 1949
Passenger Casings					
Shipments					
Original equipment	3,469,768		3,605,339	20,578,932	16,142,157
Replacement	6,899,459		5,142,304	27,884,201	21,647,360
Export	52,531		48,248	329,054	270,771
TOTAL	10,421,758	+18.48	8,795,891	48,792,187	38,060,288
Production	7,103,496	— 2.68	7,299,334	45,729,633	38,618,923
Inventory end of month	5,690,302	—36.59	8,973,878	5,690,302	9,335,979
Truck and Bus Casings					
Shipments					
Original equipment	414,068		450,413	2,624,843	2,330,531
Replacement	1,149,722		881,626	5,353,878	3,744,673
Export	54,841		66,081	433,174	582,109
TOTAL	1,618,631	+15.77	1,398,120	8,411,895	6,657,313
Production	1,160,050	— 0.80	1,169,376	8,047,506	7,101,689
Inventory end of month	1,314,398	—25.94	1,774,829	1,314,398	2,380,776
Total Automotive Casings					
Shipments					
Original equipment	3,883,836		4,055,752	23,203,775	18,472,688
Replacement	8,049,181		6,023,930	33,238,079	25,392,033
Export	107,372		114,329	762,228	852,880
TOTAL	12,040,389	+18.11	10,194,011	57,204,082	44,717,601
Production	8,263,546	— 2.42	8,468,710	53,777,139	45,720,612
Inventory end of month	7,004,700	—34.83	10,748,707	7,004,700	11,716,755
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	3,884,514		4,058,925	23,199,301	18,455,825
Replacement	5,581,262		4,331,524	23,792,894	18,551,328
Export	163,559		68,360	533,263	566,925
TOTAL	9,629,335	+13.84	8,458,809	47,525,458	37,574,078
Production	6,916,496	— 8.23	7,536,925	45,483,614	39,330,771
Inventory end of month	8,422,233	—25.12	11,248,213	8,422,233	11,364,436

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

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Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

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and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry

320 BROADWAY

NEW YORK

Compounding Ingredients—Price Changes and Additions

Accelerators, Organic			
DPG (diphenylguanidine)	lb.	$0.43 /	$0.49
DOTG	lb.	.52 /	.53
El-Sixty	lb.	.61 /	.68
M-B-T	lb.	.30 /	.36
M-B-T-S	lb.	.38 /	.44
Mertax	lb.	.44 /	.51
Santocure	lb.	.61 /	.68
Thiofide	lb.	.42 /	.49
Pellets	lb.	.36 /	.43
Thiotax	lb.	.34 /	.41
2-MT	lb.	.75	
Ureka Base	lb.	.63 /	.70
C	lb.	.68 /	.75
Zenite	lb.	.42 /	.44
A . B	lb.	.50 /	.52
Special	lb.	.43 /	.45
Accelerator-Activators, Inorganic			
Litharge, Eagle and National Lead	lb.	.1875 /	.1885
Red lead, Eagle and National Lead	lb.	.1975	
White lead, basic, Eagle and National Lead	lb.	.1175 /	.1875
White lead silicate, Eagle	lb.	.195 /	.2125
National Lead	lb.	.1575 /	.1675
Accelerator-Activators, Organic			
Emersol 110	lb.	.185 /	.1975
120	lb.	.195 /	.2075
130	lb.	.2175 /	.23
210 Elaine	lb.	.19 /	.2175
Emery 600	lb.	.145 /	.1725
Guantal	lb.	.51 /	.58
Hyfac 430	lb.	.195 /	.2075
431	lb.	.205 /	.2175
Antioxidants			
Santovar A	lb.	1.40 /	1.47
O	lb.	1.20 /	1.27
Stabilite	lb.	.49 /	.51
Alba	lb.	.72 /	.77
L	lb.	.60 /	.62
White	lb.	.49 /	.56
Powder	lb.	.39 /	.43
Blowing Agents			
Unicel	lb.	0.82	
Carbon Blacks			
Furnex (SRF)	lb.	.0375 /	.08
Micronex W-6 (EPC), Mk. II (HPC), Std. (MPC)	lb.	.07 /	.1225
Statex 93 (HMF)	lb.	.0525 /	.095
B (FF)	lb.	.0625 /	.105
K (VPF), R (HAF)	lb.	.075 /	.125
M (FEF)	lb.	.0375 /	.10
Chemical Stabilizers			
Dutch Boy DS-207	lb.	.52 /	.53
Dyphos	lb.	.5875 /	.5975
Dythal	lb.	.395 /	.405
Normasal	lb.	.425 /	.435
Plumb-O-Sil A	lb.	.2925 /	.3025
B	lb.	.3075 /	.3175
C	lb.	.3325 /	.3425
Tribase	lb.	.265 /	.275
E	lb.	.2325 /	.2425
Colors, Other Than White			
Covinylblaks	lb.	.5675 /	.795
Mapico Black	lb.	.11 /	.1125
Red	lb.	.1175 /	.12
Yellow	lb.	.095 /	.0975
Colors—White, Zinc Oxide			
Azo ZZZ-11, -44, -55	lb.	$0.16 /	$0.17
-66	lb.	.1825 /	.1925
35% leaded	lb.	.1625 /	.1725
Eagle AAA, lead free	lb.	.16 /	.17
5% leaded	lb.	.16 /	.17
35% leaded	lb.	.1625 /	.1725
50% leaded	lb.	.16⅜ /	.17⅜
Florence Green Seal	lb.	.1775 /	.1875
Red Seal	lb.	.1725 /	.1825
White Seal	lb.	.1825 /	.1925
Horsehead XX-4, -78	lb.	.16 /	.17
Kadox-15, -17, -22	lb.	.16 /	.17
-25	lb.	.1825 /	.1925
Lehigh, 35% leaded	lb.	.1625 /	.1725
50% leaded	lb.	.16⅜ /	.17⅜
Protox-166, -167	lb.	.16 /	.17
St. Joe, lead free	lb.	.16 /	.17
Standard, 5% leaded	lb.	.16 /	.17
Extenders			
B.R.S. 700	lb.	.0175 /	.026
B.R.T. No. 7	lb.	.0265 /	.0275
Fillers, Inert			
Purecal D	ton	50.00 /	65.00
M	ton	45.00 /	65.00
Latex Compounding Ingredients			
Thiocarbanilide (A-1)	lb.	.44 /	.51
Plasticizers and Softeners			
Bardol	lb.	.025 /	.035
639	lb.	.025 /	.0425
B	lb.	.0575 /	.06
BRC 20	lb.	.015 /	.016
30	lb.	.0115 /	.02
521	lb.	.019 /	.02
B.R.T. No. 7	lb.	.0265 /	.0275
B.R.S. 700	lb.	.0175 /	.026
B.R.V.	lb.	.035 /	.0515
Carbonex S	lb.	.0425 /	.0475
S Plastic	lb.	.041 /	.046
Dispersing Oil No. 10	lb.	.055 /	.0575
Monoplex DBS	lb.	.66 /	.67
DOS	lb.	.64 /	.65
Paraplex G-25	lb.	.75 /	.76
40	lb.	.45 /	.46
50	lb.	.395 /	.405
60	lb.	.425 /	.435
Plastender S	lb.	.04 /	.0425
Resin C pitch	lb.	.02 /	.0285
Reclaiming Oils			
Bardol	lb.	.025 /	.035
639	lb.	.025 /	.0425
B	lb.	.0575 /	.06
B.R.V.	lb.	.035 /	.0515
Dispersing Oil No. 10	lb.	.055 /	.0575
Reinforcers, Other Than Carbon Black			
Aluminum Flake	ton	16.50 /	22.50
No. 5	ton	21.00 /	
BRC 20	lb.	.015 /	.016
30	lb.	.0115 /	.02
521	lb.	.019 /	.02
Calcene T	ton	60.00 /	80.00
Carbonex S	lb.	.0425 /	.0475
S Plastic	lb.	.041 /	.046
Hi-Sil	lb.	.11 /	.125
Klearcarb	lb.	.1225 /	.1275
Magnesium carbonate	lb.	.095 /	.135
Purecal U	ton	120.00 /	135.00
Resin C pitch	lb.	.02 /	.0285
Silene EF	ton	120.00 /	140.00
L	ton	125.00 /	145.00
Retarders			
Retarder ASA	lb.	.55	

Statement of India RUBBER WORLD

Statement of the ownership, management, and circulation, required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, (Title 39, United States Code, Section 233) of India RUBBER WORLD, published monthly at Orange, Conn., for October, 1950.

1. The names and addresses of the publisher, editor, managing editor, and business manager are: publisher, Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.; editor Robert G. Seaman, 386 Fourth Ave., New York 16, N. Y.; managing editor, S. R. Hague, 386 Fourth Ave., New York 16, N. Y.; business manager, B. Brittain Wilson, 386 Fourth Ave., New York 16, N. Y.

2. The owner is: Bill Brothers Publishing Corp., Raymond Bill, Edward Lyman Bill, Randolph Brown, all at 386 Fourth Ave., New York 16, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

B. BRITTAIN WILSON
Business Manager

Sworn to and subscribed before me this 13th day of September, 1950.

[SEAL] HELEN M. VERLIN
Notary Public in the State of New York, Qualified in New York County, No. 31-9960500.
(Commission expires March 30, 1952)

Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interests in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Medisan, 15 Via Reggio, Turin, Italy: all sanitary and prophylactic articles.

Amita-Shoten, Central P. O. Box 56, Nagoya, Japan: scrap rubber.

Daiya Sangyo Kabushiki Kaisha, 2 Ohtemachi, 2-chome, Chiyodaku, Tokyo, Japan: rubber, industrial chemicals.

Imdanex, 34 Havrevej, Copenhagen Bronshon, Denmark: chemicals, molding and injection powder for the plastics industries, particularly polystyrene and semi-manufactured plastics.

United States Rubber Statistics — June and First Six Months, 1950

(All Figures in Long Tons, Dry Weight)

	June, 1950						First Six Months, 1950					
	New Supply			Distribution			New Supply			Distribution		
	Production	Imports	Totals	Consumption	Exports	Month-End Stocks	Production	Imports	Totals	Consumption	Exports	Period-End Stocks
Natural rubber, total	0	73,911	73,911	59,074	625	95,583	0	365,683	365,683	337,545	3,509	95,583
Latex, total	0	3,965	3,965	4,259	0	3,874	0	23,015	23,015	24,946	0	3,874
Rubber and latex, total	0	77,876	77,876	63,333	625	99,457	0	388,698	388,698	362,491	3,509	99,457
Synthetic rubbers, total	*32,765 †5,804	2,433	41,002	48,608	622	65,346	*167,920 †32,937	13,760	214,617	226,554	3,697	65,346
GR-S types	*30,146 †370	1,808	32,324	37,256	68	47,987	*143,320 †1,885	11,539	156,744	170,038	524	47,987
Butyl	*2,619	625	3,244	6,005	0	8,793	*24,600	2,221	26,821	29,967	10	8,793
Neoprene	†3,881	0	3,881	3,672	459	5,232	†23,483	0	23,483	19,786	2,258	5,232
Nitrile types	†1,553	0	1,553	1,675	95	3,334	†7,569	0	7,569	6,763	905	3,334
Natural rubber and latex, and synthetic rubbers, total	38,569	80,309	118,878	111,941	1,247	164,803	200,857	402,458	603,315	589,045	7,206	164,803
Reclaimed rubber, total	25,869	91	25,960	25,253	889	28,470	136,336	302	136,638	132,727	5,432	28,470
GRAND TOTALS	64,438	80,400	144,838	137,194	2,136	193,273	337,193	402,760	739,953	721,772	12,638	193,273

*Government plant production.
†Private plant production.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

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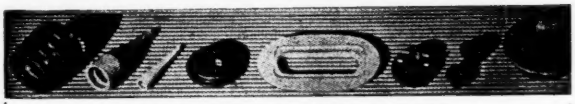

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NEW YORK 16, N. Y.

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

	June, 1950		First Half, 1950	
	Quantity	Value	Quantity	Value
Imports for Consumption of Crude and Manufactured Rubber				
UNMANUFACTURED, Lbs.				
Crude rubber	165,325,204	$31,525,162	817,953,181	$137,135,996
Latex	8,881,774	2,294,158	50,406,666	11,784,523
Chicle, crude	502,310	293,330	662,289	383,612
Guayule	235,200	33,651	1,153,600	148,698
Balata	320,183	74,936	1,081,708	304,142
Jelutong or Pontianak	268,905	104,123	1,774,745	658,549
Gutta percha	109,800	112,902	561,948	291,673
Synthetic rubber	5,450,875	952,297	30,819,966	5,142,240
Reclaimed rubber	204,400	11,682	677,959	30,776
Scrap rubber	3,743,089	124,791	16,467,889	518,519
TOTALS	185,041,740	$35,527,032	921,559,951	$156,398,728
MANUFACTURED				
Tires and casings: auto, etc. *no.*	2,380	$37,353	9,508	$144,204
Bicycle *no.*	955	820	5,030	4,677
Other *no.*	12	151	3,920	2,303
Inner tubes: auto, etc. *no.*	295	579	1,237	1,790
Rubber footwear:				
Boots *prs.*	3,150	9,561	12,713	32,854
Shoes and overshoes *prs.*	10,614	5,493	23,497	15,148
Rubber-soled canvas shoes *prs.*	6,507	5,970	19,032	13,555
Athletic balls: golf *no.*	88,140	19,139	231,849	51,258
Tennis *no.*	41,178	8,525	464,361	70,027
Other *no.*	362,466	24,922	2,568,614	183,892
Rubber toys, except balloons	.....	40,078	.....	288,027
Hard rubber products	.....	25,873	.....	83,332
Rubberized printing blankets *lbs.*	485	678	1,377	2,666
Rubber and cotton packing *lbs.*	375	409	5,164	4,747
Gaskets and valve packing	.....	697	.....	1,501
Molded rubber insulators	.....	.....	.....	4,192
Rubber belting *lbs.*	879	1,464	8,838	11,444
Hose and tubing	.....	5,155	.....	16,247
Drug sundries	.....	2,462	.....	13,763
Instruments *doz.*	100	245	5,047	8,382
Other rubber products	.....	258	.....	592
Rubber heels and soles *lbs.*	6	39	6	39
Bands *lbs.*	1,260	989	9,037	4,020
Gutta percha manufactures *lbs.*	.....	.....	3,191	2,177
Synthetic rubber products	.....	131	.....	2,390
Other soft rubber products	.....	94,507	.....	433,412
TOTALS	.....	$285,498	.....	$1,396,639
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$35,812,530	.....	$157,795,367
Reexports of Foreign Merchandise				
UNMANUFACTURED, Lbs.				
Crude rubber	1,400,216	$322,008	7,851,992	$1,756,237
Balata	3,352	1,200	65,876	38,965
Butyl synthetic rubber	.....	.....	14,255	2,690
Chicle and chewing gum bases	1,800	1,855	3,600	3,584
Scrap rubber	.....	.....	61,290	4,263
TOTALS	1,405,368	$325,063	7,997,013	$1,805,729
MANUFACTURED				
Drug sundries, except water bottles and fountain syringes	.....	$822	.....	$1,672
Rubber and rubberized clothing	.....	.....	.....	177
Toy and novelty balloons	.....	.....	.....	975
Rubber toys and balls	.....	2,951	.....	7,927
Tires and casings: auto *no.*	.....	.....	16	196
Farm tractor, etc *no.*	.....	.....	165	4,355
Inner tubes: auto, bus, truck *no.*	.....	.....	65	343
Other *no.*	.....	.....	156	673
Solid tires: truck and industrial *no.*	.....	.....	100	8,427
Hard rubber products	.....	.....	.....	115
Erasers *lbs.*	.....	.....	2,040	551
Hose and tubing *lbs.*	.....	.....	4,790	3,856
Latex and other compounded rubber for further manufacture *lbs.*	2,736	822	6,591	2,868
Other natural and synthetic rubber manufactures	.....	1,223	.....	3,828
TOTALS	.....	$5,818	.....	$35,963
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$330,881	.....	$1,841,692

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

	June, 1950		First Half, 1950	
	Quantity	Value	Quantity	Value
Exports of Domestic Merchandise				
UNMANUFACTURED, Lbs.				
Crude rubber	.....	.....	8,231	$4,230
Chicle and chewing gum bases	299,973	$119,178	1,294,959	506,125
Balata	7,198	4,075	9,839	11,372
Syntnetic rubbers: GR-S	.....	.....	1,020,130	256,581
Butyl	.....	.....	9,050	1,601
Neoprene	1,028,439	362,509	5,059,914	1,784,226
Nitrile	211,725	102,361	2,024,841	935,980
"Thiokol"	2,900	1,457	15,264	9,263
Polyisobutylene	23,400	7,733	345,650	108,024
Other	888	926	38,442	28,851
Reclaimed rubber	1,990,594	148,716	12,069,083	1,023,965
Scrap rubber	743,059	13,362	11,910,876	287,898
TOTALS	4,308,176	$760,317	33,806,279	$4,958,116
MANUFACTURED				
Rubber cement *gals.*	101,106	$203,964	399,685	$759,356
Rubberized fabric: auto cloth *sq. yds.*	17,607	17,828	54,367	59,191
Piece goods and hospital sheeting *sq. yds.*	94,291	57,864	421,170	263,305
Rubber footwear:				
Boots *prs.*	4,951	20,739	27,268	115,954
Shoes *prs.*	4,242	7,398	43,232	50,923
Rubber-soled canvas shoes *prs.*	16,535	28,778	84,544	158,555
Soles *doz. prs.*	22,280	58,406	135,409	347,463
Heels *doz. prs.*	64,650	57,085	372,219	317,324
Rubber soling and top-lift sheets *lbs.*	284,139	42,892	1,568,880	277,557
Gloves and mittens *doz. prs.*	11,979	37,110	71,797	234,740
Drug sundries: water bottles and fountain syringes *no.*	25,319	16,316	167,754	108,754
Other	.....	176,668	.....	978,443
Rubber and rubberized clothing	.....	137,700	.....	837,118
Toy and novelty balloons	.....	25,874	.....	145,780
Rubber toys and balls	.....	29,360	.....	136,438
Erasers *lbs.*	22,045	16,595	117,558	81,327
Hard rubber goods:				
Battery boxes *no.*	27,379	37,778	133,151	204,924
Other electrical goods *lbs.*	108,701	53,509	697,910	527,516
Combs, finished *doz.*	11,694	8,612	33,925	37,792
Other	.....	9,211	.....	54,479
Tires and casings:				
Truck and bus *no.*	59,755	2,294,935	372,490	13,855,031
Auto *no.*	33,800	384,133	216,369	2,580,604
Aircraft	.....	62,842	.....	408,331
Farm tractor, etc *no.*	6,741	218,068	41,263	1,329,075
Other off-the-road *no.*	7,517	605,676	21,293	1,848,138
Bicycle *no.*	9,526	13,483	50,112	62,551
Motorcycle *no.*	183	1,203	2,188	14,759
Other *no.*	1,580	20,488	12,496	213,211
Inner tubes: auto, bus, truck *no.*	54,589	176,664	310,203	982,146
Other *no.*	9,073	39,132	63,475	237,368
Solid tires: truck and industrial *no.*	1,016	23,896	13,033	292,666
Other *lbs.*	.....	.....	5,559	570
Tire repair materials: camelback *lbs.*	240,215	64,791	1,130,941	300,628
Other *lbs.*	171,827	138,081	964,372	758,995
Rubber and friction tape *lbs.*	51,804	35,650	274,839	185,273
Belting: auto and home *lbs.*	77,039	98,443	430,883	533,467
Transmission:				
V-belts *lbs.*	74,754	127,311	513,432	868,541
Flat Belts *lbs.*	26,333	34,153	240,471	264,699
Other *lbs.*	36,802	37,930	149,252	152,590
Conveyer and levitator *lbs.*	150,173	83,285	498,256	317,448
Other *lbs.*	3,806	6,067	107,319	110,953
Hose and tubing *lbs.*	598,107	393,308	2,687,311	1,834,505
Rubber packing *lbs.*	134,115	141,069	666,769	657,667
Mats, flooring, tiling *lbs.*	585,529	127,494	3,198,301	732,102
Thread: bare *lbs.*	11,459	17,849	66,746	103,166
Textile covered *lbs.*	17,586	37,266	84,610	218,959
Gutta percha manufactures *lbs.*	3,984	3,474	16,906	16,417
Latex and other compounded rubber for further manufacture *lbs.*	1,353,481	299,303	3,526,222	987,372
Other natural and synthetic rubber manufactures	.....	356,074	.....	2,130,318
TOTALS	.....	$6,884,755	.....	$37,694,489
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$7,645,072	.....	$42,652,505

A RUBBER GOODS FACTORY RECENTLY WAS OPENED IN GUADALAJARA, Mexico, making rubber balls, bladders, soccer balls, and tubing, with 25 employes. Eventually rubber parts for pumps, rubber mats, and other small industrial parts of rubber that could be made on the machines available will also be manufactured. At present three tons of crude rubber a month can be handled.

IN COLOMBIA TIRE OUTPUT HAS BEEN INCREASING YEAR TO year during the last three years, and the upward trend seems to be continuing. In the first half of 1949, 66,463 tires and 47,970 tubes were manufactured, compared with 122,500 tires and 63,806 tubes for the whole of 1948. About 60% of the tires and tubes are for trucks and buses, and the rest are for passenger cars.

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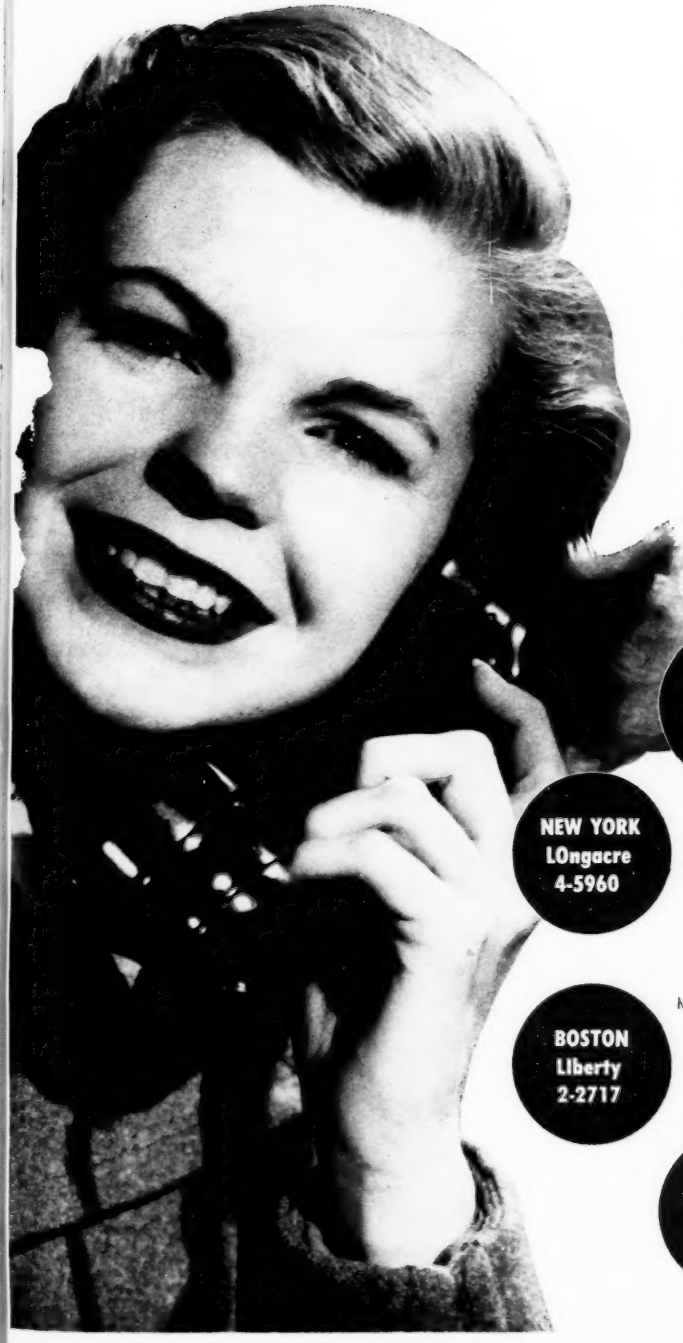

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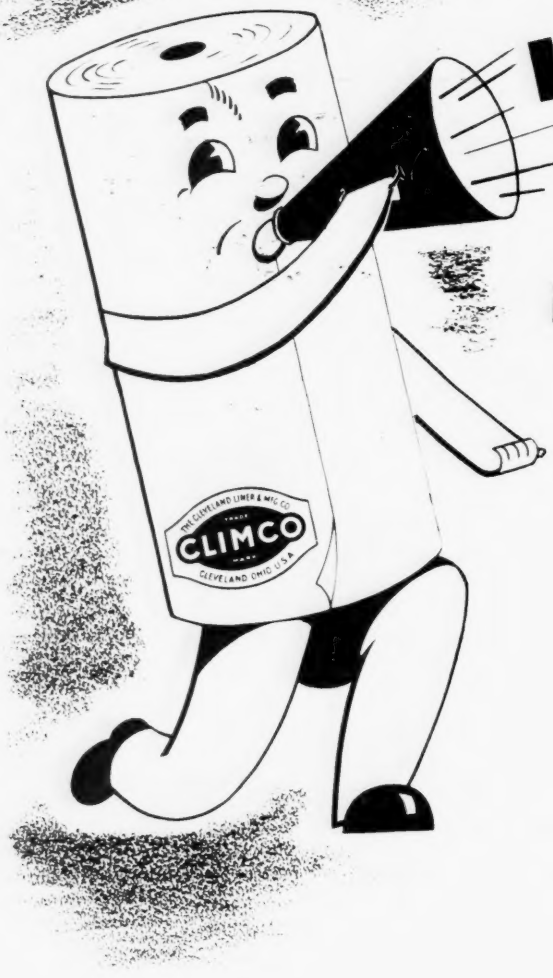

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